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

14 March 2006

Available online 22 April 2006

doi: 10.1016/j.jhazmat.2006.03.065

R.W. Crites, E.J. Middlebrooks, S.C. Reed, Natural Wastewater Treatment Systems, CRC/Taylor & Francis, Boca Raton, FL, 2006 (572 pp., USD 169.95, ISBN 0-8493-3804-2).

The importance of this book is well illustrated by the following comment in its preface: "Natural systems for the treatment and management of municipal and industrial wastewaters and residuals feature processes that use minimal energy and minimal or no chemicals, and they produce relatively lower amounts of residual solids."

The processes described in this book are ones ". . .designed to utilize natural responses to the maximum possible degree. . ." in order to attain the intended wastewater treatment goal.

Natural treatment systems for effective wastewater treatment fall into three major categories:

- aquatic treatment units (oxidation ponds, facultative ponds, partial-mix aerated ponds, storage and controlled-discharge ponds, and hyacinth ponds);
- wetland treatment units (natural marshes and constructed wetlands);
- terrestrial treatment units (slow rate, soil aquifer treatment, overland flow, and on-site).

Since I have done research on sludge management, I was particularly interested in the chapter on that topic (Chapter 9). Like the rest of the book, it is comprehensively written and illustrated by the subsection titles used in the chapter. They are as follows:

- sludge quantity and characteristics,
- stabilization and dewatering,
- sludge freezing,
- reed beds,
- vermistabilization,
- comparison of bed-type operations,
- composting,
- land application of disposal solids.

Although not extensively treated, the authors do discuss the content and impact of heavy metals in sewage sludge (my research area). In this discussion, they cite the loading rates found in 40CFR Part 503, which contains the US EPA standards for the use or disposal of sewage sludge.

Throughout the book, the authors combine theory and practice well. Process description equations are developed well with the underlying theory discussed and several excellent examples of their use given. To illustrate the comprehensive treatment, I will include the material from Chapter 4, "Design of Wastewater Pond Systems." Discussed are:

- facultative ponds (areal loading rate method, Gloyna method, complete-mix model, plug-mix model, and Whener–Willhelm equation);
- partial-mix ponds (design model, pond configuration, and mixing and aeration);
- complete-mix aerated pond systems (design equations, pond configuration, and mixing and aeration);
- anaerobic ponds;
- controlled discharge pond systems;
- complete retention pond system;
- hydrograph controlled system;
- hydrograph controlled release;
- high-performance aerated pond systems (Rich design);
- proprietary systems (advanced integrated wastewater pond systems and BIOLAC system);
- LEMNA systems.

This chapter contains a wealth of information about the above-noted treatment systems.

While the book appears to have been written for practicing engineers it would, in my opinion, be an excellent textbook for graduate students (but that use would be enhanced if student problems were included). The text is both theoretical and explanatory. Design equations are included and explained well. Numerous design examples (the book cover says there are 30) based on the theory presented in the book are included. Much data (there are 178 tables) and graphs are included in the book.

My overall assessment is that this is an excellent addition to the literature. It will be the standard in the field for years to come.

Gary F. Bennett *
Department of Chemical and Environmental Engineering, University of Toledo, 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

26 March 2006

Available online 22 April 2006

doi: 10.1016/j.jhazmat.2006.03.067

D. Hendricks, Water Treatment Unit Processes: Physical and Chemical, CRC/Taylor & Francis Group, Boca Raton, FL, 2006 (1314 pp., Price: US$ 129.95 ($8\frac{1}{2} \times 11$ in. format), ISBN: 0-8247-0695-1).

The sheer size of this book makes a comprehensive review virtually impossible. Without doubt, Hendricks has written the

most complete text on water treatment processes that I have seen. This book is a tribute to his lifetime of work in the environmental field.

Water treatment unit processes is designed, according to Hendricks, for several kinds of uses: (1) as a text for a water treatment course, (2) as a reference for practicing engineers, and finally (3) as a reference for persons in operations. In my opinion, this book admirably suits all three intended uses, especially as a textbook. Copious figures, tables, and photographs of equipment enhance the text's use. Regarding this use, Hendricks notes: "As related to the tiered design, the book has more content that would be feasible in a one or two semester course. The design is such, however, that an instructor can assign the pertinent sections and the student may wish to amplify with other sections that may be of interest."

With the same thoroughness as he showed in writing the text, Hendricks has provided a most comprehensive Table of Contents. That section is 40 pages long. In it, he lists 21 chapters (including the numerous subsections for each) which, for the sake of brevity, I will list but not describe: (1) water treatment, (2) water contaminants, (3) models, (4) unit process principles, (5) screening, (6) sedimentation, (7) grit chambers, (8) flotation, (9) coagulation, (10) mixing, (11) flocculation, (12) rapid filtration, (13) slow sand filtration, (14) cake filtration, (15) adsorption, (16) ion exchange, (17) membrane processes, (18) gas transfer, (19) disinfection, (20) oxidation, and (21) precipitation.

To say the least, the topic at hand has been covered thoroughly. For textbook use, Hendricks has provided student problems at the end of each chapter.

The material accompanying the book notes:

> "Professor Hendricks emphasizes the fundamentals, using simple explanations and avoiding models that are too complex mathematically, allowing students to assimilate principles without getting sidelined by excess calculations. Applications of unit processes principles are illustrated by example problems in each chapter. Student problems are provided at the end of each chapter; the solutions manual can be downloaded from the CRC Press website. Excel spreadsheets are integrated into the text as tables designated by a 'CD' prefix. Certain spreadsheets illustrate the idea of 'scenarios' that emphasize the idea that design solutions depend upon assumptions and the interactions between design variables. The spreadsheets can be downloaded from the CRC website."

Each chapter is followed, as I noted earlier, by student problems. The author also has included references and a glossary for each chapter. A four-page section in the Table of contents lists titles of supplemental material that can be downloaded from the CRC website.

I have reviewed very few books that approach this one in comprehensive coverage of a topic. This book is clearly the product of a lifetime of work in the field by the author. As a textbook, *Water treatment unit process*es will be without peer.

Gary F. Bennett *
Department of Chemical and Environmental Engineering, University of Toledo, 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

1 April 2006

Available online 22 April 2006

doi: 10.1016/j.jhazmat.2006.04.010

M.N.V. Prasad, K.S. Sajwan, R. Naidu (Eds.), Trace Elements in the Environment: Biogeochemistry, Biotechnology, and Bioremediation, CRC/Taylor & Francis Group, Boca Raton, FL, 2006 (744 pp., Price: US$ 159.95, ISBN 1-56670-685-8).

The concentrations may be small, the role of trace elements in the environment is very large. Some elements are required for growth while others are toxics. The editors note, "Trace element behavior and fate depend upon their chemistry in soil inorganic and organic phases; their bioavailability depends on a variety of factors concerning the ambient environment, soil, and/or sludge.

For this book, the editors have assembled 33 papers that discuss the applications of strategies of the problem of toxic elements in the environment. The editors have acquired an impressive list of papers written by 69 authors from 18 countries.

Key features of the book, according to the flyer that came with it, are described below. The various contributions:

- Emphasize biotechnological aspects from the transgenic plants for environmental cleanup to microbial sensors for monitoring trace elements.
- Provide background information and appropriate examples for the understanding of trace elements in the biogeosphere.
- Discuss the use of biomaterials as efficient and affordable methods for cleaning up heavy-metals contaminated soils.
- Examine the scope and limitation of plant metallothionein genes, genetic engineering for the cleanup of toxic trace elements, and metallomics.
- Cover the advantages and limitation, adaptive physiology, and rhizosphere biotechnology of bioremediation.

The papers are published under five major section headings with the number of papers in each section noted in brackets:

1. Bioavailability (5).
2. Biogeochemistry (5).
3. Biotechnology (9).
4. Bioremediation (11).
5. Risk assessment (3).

The broad coverage is well-illustrated by a review of some of the papers in the Bioremediation Section. For example, papers