

Clearly, this is a narrow book with a single industry focus. As such, it will not have, I believe, a major number of sales. It will, however, be a 'must' for those in the field.

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Groundwater Remediation and Treatment Technologies, N.P. Cheremisinoff, Noyes Publications, Park Ridge, NJ, 1998, US\$68.00, 395 pp., ISBN: 0-8155-1411-5

The intended audience of the book is practicing engineers who deal with groundwater and leachate remediation. Much of the information in the book came from U.S. EPA publications as evidenced by the author's reproduction of U.S. EPA fact sheets in the 40-page first appendix.

The book begins with a primer on geology (a topic that has not normally been discussed in other books on engineering). Cheremisinoff's *Principles of Geology* is followed by two companion chapters: *Relationship Between Groundwater and Surface Water* and *Principles of Hydrogeology*.

Having established background (the fundamentals of the medium contaminated), the author moves to the topic at hand: *Groundwater Contamination*. Described are sources, probable causes and movement (migration).

Solving the contaminant problem begins in Chapter 5: *Groundwater Restoration Through In-Situ and Ex-Situ Practices*. I was disappointed in the references used as none was less than 8 years old and the average publication date was 14 years ago.

Subsequent chapters are entitled:

- Pump-and-Treat Remediation Technology
- Treating Contaminated Groundwater and Leachate

In addition to the EPA fact (process description) sheets, the appendix contains (1) water solubility, vapor pressure, Henry's Law Constant, K_{oc} and K_{ow} data (for more than 400 chemicals), (2) viscosity and density data and (3) short site-specific summaries of pump-and-treat application.

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Fundamentals of Environmental Engineering, Danny D. Reible, Lewis Publishers, Boca Raton, FL, 1999, \$69.95, 526 pp., ISBN: 0-56670-047-7

Fundamentals of Environmental Engineering is the third book to have been written recently by a faculty member of the Department of Chemical Engineering of Louisiana State University (LSU). All three published books are excellent.

The first book from this group was *Environmental Chemodynamics* by L.J. Thibodeaux (now in its second edition). The second book was *Elements of Environmental Engineering: Thermodynamics and Kinetics* by K.T. Valsaraj (reviewed previously in this journal).

The unique aspect of Reible's book is that it was written for chemical (environmental) engineering students. In a field dominated by civil engineers, it is a pleasure for this

reviewer (being a chemical engineer himself), to see references to chemical engineering texts e.g. Seinfeld's two air pollution control texts, Himmelblau's *Basic Principles and Calculations in Chemical Engineering*, and Felder and Rousseau's *Elementary Principles of Chemical Processes*. All of these books describe fundamental chemical engineering theory underlying environmental control processes.

Reible addresses the deficiencies in prior texts, stating it (much better than I could) this way:

“With few exceptions, the introductory textbooks are surveys of environmental pollutants, their effects, and qualitative discussions of control or treatment devices. This is very different from the introductory textbooks in most engineering fields which tend to be quantitative and focused on problem solving and problem-solving techniques at the same time as they use examples that illustrate the application of these techniques and methods to that engineering discipline.”

To serve the needs of engineers (really chemical engineering students), Reible describes his ‘new approach’ in designing a text for undergraduate (second or third year) engineering students. To this end, he admits his bias (and mine, as well, as chemical engineers) and outlines his goals:

“I believe that the technology associated with the unit operations for waste treatment, control, and cleanup are naturally taught from a background similar to that of a chemical engineer. In addition, the fate and transport behavior of pollutants and the pharmacokinetics which describe their action on receptors are clearly dependent on chemical and dynamic principles that are central to the education of a chemical engineer. This suggests to me that the natural starting point for an environmental engineer is a firm grounding in dimensional analysis, physical chemistry, mass, energy, and component balances, and application of these topics to environmental engineering problems.”

What he delivers in the text is true to the goals he cited above. The text has the following eight chapters: • Introduction • Environmental Hazards and Their Management • Introduction to Environmental Engineering Calculations • Physical and Chemical Equilibrium • Rate Processes • Water Pollution and Its Control • Air Pollution and Its Control • Soil Pollution and Its Control

The reader (of this review) will note that Reible has indeed started with the basics. His Chapter 2 discusses environmental problems in general, focussing mainly on air and water pollution; but he does not stop there, moving on to attack (i.e. how to manage) environmental hazards. In this discussion he covers risk, risk-based standards, cost-benefit analysis, exposure assessment and response/dose curves. The chapter ends with a short discussion of life-cycle analysis and pollution prevention.

True to his training as an engineer, the author moves from the general (discussion) to the specific (calculations). In the next chapter, he starts with a discussion of British (he used the word American) units of measurement and contrasts them to metric units. The gravitational constant is used to illustrate his discussion. Pressure calculations, dimensional analysis and treatment of data (statistically) are important topics (among others) covered in this chapter.

Chapter 4 continues with more chemical engineering fundamentals, discussing the concept of physical and chemical equilibrium. Conventional chemical engineering thermodynamics and phase diagrams are two topics of note. The author moves closer to

application of this material with a discussion of fluid–solid partitioning leading up to a discussion of Langmuir, BET and Freundlich isotherms.

A logical next step is the discussion of Rate Processes, which is the topic of Chapter 5. Found here are lectures on material balances, fate processes (sorption and reaction), and transport processes (air/water transport processes).

Having well covered the fundamentals underlying rate and mass transfer processes in the environment, Reible addresses environmental control in three separate chapters; one devoted to each environmental medium: • air pollution and its control • water pollution and its control • soil pollution and its control

The author has done an excellent job describing both the environmental problems and their solutions. Each topic is addressed both philosophically (word text) and quantitatively (mathematically). Given the limits of space, my analysis is Reible has done an excellent job.

A reader of this review will have concluded by now that I like the book—and I do. It is one of the best texts to have been written for teaching environmental engineering in years and is one I predict will be adopted by many environmental (from a chemical engineering perspective) engineering professors, especially chemical engineering/environmental faculty.

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International Environmental Consulting Practice: How and Where to Take Advantage of Global Opportunities, Peter A. Sam, Wiley, New York, NY, 1998, \$ 59.95, 300 pp., ISBN: 0-471-17984-1

Environmental concerns and environmental regulations reach beyond the developed countries to the lesser developed countries (LDCs), presenting established consulting firms in the developing countries with new business opportunities. How to access this new market is the concern that this book addresses.

The book coverage, chapter by chapter, is concisely outlined by the author in his preface. I repeat it here as I cannot improve on what he has written.

“Chapter 1 consists of an introductory discussion on how environmental consulting practices facilitate global environmental management decisions.

Chapter 2 discusses the forces that shape and address global environmental issues. It explains the driving forces that trigger international environmental consulting and discusses the global environmental industry and markets. The role of the international donor community in creating consulting opportunities in the international market is presented, and the reader is introduced to the three major entities and institutions—international development assistance agencies; foundations, charitable and other nonprofit organizations; and foreign governmental institutions—that create opportunities for consulting work within the global environmental market.

Chapter 3 provides the reader with detailed principles to consider before entering into an international environmental practice, together with methods of approach in preparing for international environmental consulting practice.