of bioremediation and natural attenuation". My assessment of these chapters is that they are a most excellent review of the topic and are a very good review of the state of current technology.

In contrast to the preceding chapters, these two chapters on bioremediation are short on mathematics but long on discussion being well illustrated with diagrams of treatment systems and presentation of real-life case studies. Prominent in the Reference section are citations of the excellent proceedings published by Battelle Press for their international conferences on in situ and on-site bioreclamation symposiums (these conferences were held every second year from 1991 to 1999).

In conclusion, my assessment is that this is an excellent book. The topic is important; both theory and state-of-the-art are well discussed and well described. I agree with the statement on the back cover of the book which says: "This book provides, under one cover, the current methodologies needed by groundwater scientists and engineers in their efforts to evaluate subsurface contamination problems, to estimate risk to human health and ecosystems through mathematical models, and to design and formulate appropriate remediation strategies".

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10 January 2006

Available online 28 February 2006

doi: 10.1016/j.jhazmat.2006.01.072

Hazardous Materials Characterization: Evaluation Methods, Procedures, and Considerations, D.A. Shafer, Wiley-Interscience, Hoboken, NJ (2006). (378 pp., US$ 74.95, ISBN 0-471-46257-8).

Hazardous materials are ubiquitous substances found in almost every work place. Knowledge of their potential hazards is essential. This book, to some extent, supplies that knowledge. However, as a text, it adds very little to the body of literature on hazardous materials that I am familiar with as most of the book is a discussion that is relatively simplistic (although in the author's defense, the material he supplies is probably relatively useful to the non-safety professional). The book appears to have been written for lower level supervisors, i.e., those in industry who do not have a scientific background. Indeed, I found the writing clear. Missing, however, (for one who has been involved with many research papers on hazardous materials published in this journal and elsewhere) were references to the literature. Indeed, the one extensive reference was a list of hazardous chemicals with their CAS Numbers. That list was 17 pages long but really supplies the reader with little information.

Chapter 4, entitled "Hazards Characterization and Site Evaluation," contains five excellent checklists:

1. Environmental Health and Safety (Hazardous/regulated materials, Hazardous/regulated wastes, Wastewater, and Air, and Environmental reporting);
2. Hazardous Materials Communication;
3. Respiratory Protection;
4. Confined Space Entry;
5. Ventilation.

In Chapter 9, the author does a decent job of describing the hazards of biological agents such as viruses, bacteria, fungi, and pathogenic parasites. Selected biohazards that were covered included anthrax, avian flu, blood borne pathogens, botulism, smallpox, and viral hemorrhagic fevers. He also included AIDs, which surprised me.

Other problems I found included the mention of a BLEVE which is a hazard resulting from fire impinging upon propane tanks. That certainly is a chemical hazard that deserves treatment, but unfortunately the amount of information given by the author was, in my opinion, inadequate. There were several pictures in the book, but almost all were limited to examples of responders in protective gear.

The book "breaks some new ground" in the final two chapters entitled: (1) Disaster site work and (2) Characterization of CBRNE terrorist threats and weapons of mass destruction (WMD). Given the impact on the health of responders to the September 11 terrorist attack in New York City and the subsequent world-wide concern for terrorism-caused incidents, these two chapters are extremely important. The author is to be commended for their inclusion.

The book ends with a complete 17-page glossary.

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17 January 2006

Available online 28 February 2006

doi: 10.1016/j.jhazmat.2006.01.073

L. Theodore, Nanotechnology: Basic Calculations for Engineers and Scientists, Wiley/Interscience, Hoboken, NJ, 2006 (US$ 82.50, 479 pages, ISBN 0-471-73951-0).

A citation from microbiology I recall notes ". . . the role of the infinitely small is infinitely large." What is true for microbes is also true for particles—nanoparticles. Nanotechnology is a rapidly developing field and the topic of a second book that

Theodore has authored in this area. The first of these two books, I recall, said very little about nanoparticles. This book has more on nanotechnology but the discussion of nanotechnology is limited to a couple of chapters which are in Part 3 entitled "Applications."

The above noted section begins with a chapter on legal considerations. It is followed by chapters on size reduction, prime materials, and production manufacturing routes. Clearly, particle science is important as is the topic title nanotechnology which still is quite new. Theodore says, "Despite some modest successes in the nanotechnology field, most conceived, however, that real, commercial-scale success in this arena is still years, if not decades, away."

Patents issued are a measure of activity in the field. In terms of patents issued, "... those involving nanotechnology have increased by over 600% in the 1997–2002 time period; from 370 in 1997 to 2650 in 2002." "New filings of nanotechnology-related patent applications are evenly split between process inventions and product inventions, as is typical for all patent applications."

Nanoparticles are available for experimentation. Various oxides of metals including iron oxides, silica dioxide, titanium dioxide, aluminum oxide, zirconium dioxide, and zinc oxide are readily available in commercial quantities and presently are being used in a wide range of existing applications and envisioned in many others.

According to the author, the future looks bright. He notes:

> "For technology's most ardent supporters, the scope of the emerging field seems to be limited only by the imaginations of those who would dream at these unprecedented dimensions. However, considerable technological and financial obstacles will need to be reconciled before nanotechnology's full promise can be realized."

The book further notes:

> "Beyond just their efforts to produce and use nanometer-sized particles of various materials, some nanotechnology-related scientists and engineers are pursuing far more ambitious – and some would say fantastic or futuristic – applications of this powerful new technical paradigm. For instance, the research community is working toward being able to design and manipulate nanoscaled objects, devices, and systems by the manipulation of individual atoms and molecules."

However, the book's contents mainly deal with topics other than nanotechnology. The main focus of the writing is on problem solving in the chemical engineering area. In this regard, the author has done an exceedingly good job at providing problems and their solutions. The back cover of the book notes:

> "The author has developed nearly 300 problems that provide a clear understanding of this growing field in four distinct areas of study: (1) chemistry fundamentals and principles, (2) particle technology, (3) applications and (4) environmental concerns."

Both mathematical and discussion exercises are included. The book begins at the beginning with the simplest process of unit conversion being discussed. The problems become more complex after that and span a wide spectrum of environmental engineering topics with an emphasis on air pollution. Problem statements were followed by solutions, but the material was not limited solely to mathematical exercises. Answers follow all problems and discussion questions.

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19 January 2006

Available online 28 February 2006

doi: 10.1016/j.jhazmat.2006.01.074

Rubber Recycling, S.K. De, A.I. Isayev, K. Khait (Eds.). CRC Press, Taylor & Francis Group, Boca Raton, FL (2005). (528 pp., US$ 149.95, ISBN 0-8493-1527-1).

Only a few of the books I have reviewed dealt with untreated (or rarely treated) topics as this one does. This book, Rubber Recycling, is one that deals with an important but rarely discussed problem—the dilemma of the increasing number of discarded tires which are stockpiled (discarded) too often in fields where fires occur, emitting clouds of toxic gasses and taxing the resources of the local fire department to suppress the smouldering mass. Even if they do not catch fire, tires provide a ready breeding site for mosquitoes.

For developed countries, one of the contributors notes, the rule of thumb is that one scrap tire is generated per inhabitant per year. In the United States, this translates to 300 million tires generated in 2003. The disposal (or reuse) of these discarded tires presents a major challenge to society. Should they be burned and burned safely or can they be recycled? The former process poses the challenge of air emissions; the latter process presents technical questions regarding how they can be economically and technically reused.

The authors note, "The processing or reduction of old tires into useful particle sizes has been a challenge to the recycler since Charles Goodyear first discovered vulcanization." Once vulcanized, the tire produced is nearly indestructible to normal mechanical fracturing mechanisms. Thus the challenge is to break the tire down into its separate major components—fiber, steel, and rubber. What can these scrap tires be used for? The authors note that they can be sold as secondhand usable tires, used as fuel in cement kilns, included as recycled rubber crumb as flexible filler in ceramic tile adhesives, incorporated (the steel