

fraction) into pallets, utilized as cover for silage, used as a source of raw material for special shoe-manufacturing, pyrolyzed to produce oils, gas, and char and as an ingredient in asphalt rubber.

The problem with many of the above processes is that for vulcanized rubber it is difficult to break the cross-links that are formed during the vulcanization process in order to obtain material the same as or similar to unvulcanized virgin compound.

Currently, four major technologies are being used for tire disposal. They are: (1) recycling, (2) reclaiming, (3) pyrolysis and (4) tire-derived fuel (TDF). Among the more innovative uses are inclusion of rubber in highways or use in covering athletic fields.

One of the interesting ways to break down tires is cryogenic grinding. Another technique employs ultrasound to devulcanize used tires and waste rubber (as an aside, I might note that ultrasonic technologies have been used in several projects dealing with water and wastewater research that I have sent out for review lately).

The editors have cast their net wide for authors, obtaining contributions from scientists in the United States, Canada, The Netherlands, India, and South Africa. The authors have contributed the following chapters:

1. Manufacturing practices for the development of crumb rubber materials from whole tires;
2. Quality performance factors for tire-derived materials;
3. Untreated and treated rubber powder;
4. Tire rubber recycling by mechanochemical processing;
5. Recycling cross-linked networks via high-pressure high-temperature sintering;
6. Powdered rubber waste in rubber compounds;
7. Rubber recycling by blending with plastics;
8. Strategies for reuse of rubber tires;
9. Ultrasonic devulcanization of used tires and waste rubbers;
10. Devulcanization by chemical and thermomechanical means;
11. Conversion of used tires to carbon black and oil by pyrolysis;
12. Markets for scrap tires and recycled rubber.

In ending this review, I quote from the flyer provided by the publisher:

“Rubber Recycling is one of those rare books that has the potential to directly impact our ecological well-being. The editors of this important volume have filled a void in technological responsibility by bringing together a group of international experts who, using substantial research evidence, prove that the utilization of recycled rubber is not just desirable, but is all quite feasible and profitable.”

I agree with the foregoing comment. The book clearly and thoroughly discusses the topic (potential and problems) of rubber recycling. It will be the standard reference on the topic for many years to come.

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**I.G. Droppo, G.G. Leppard, S.N. Liss, T.G. Milligan (Eds.),  
 Flocculation in Natural and Engineered Environmental Systems, CRC Press, Boca Raton, FL, 2005 (457 pages, US\$ 149.95, ISBN 1-56670-615-7).**

This book resulted from a workshop held in September 2003 at the Canada Centre for Inland Waters. It contains 19 peer-reviewed papers presented at this conference by contributors from both North America and Europe. The papers have been published under three main headings:

1. Freshwater environments
2. Saltwater environments
3. Engineered systems

The importance of the topics is illustrated by the editors who write the following in the initial paragraph of the preface:

“In the history of environmental science, there has probably been no greater struggle than the attempt to control the impact of the sediment and solids generated by nature and human influence (including industrial processing) on the terrestrial and aquatic environment and on socioeconomics in general. Untold billions of dollars are spent each year on dredging to maintain navigation channels and harbors. Further costs are added by the need to treat these sediments prior to disposal because of high levels of contamination resulting from anthropogenic impacts on the environment. Significant financial burdens arise as a result of the need to remove solids during drinking water and wastewater treatment processes, a necessity for sustainable development, and the protection of human and aquatic health. It is now well established that the majority of particles within natural (freshwater and saltwater) systems are present in a flocculated form (i.e., flocs), and that the formation of flocs is essential for the effective performance of engineering processes such as biological wastewater treatment.”

Flocculation is thoroughly discussed in the 19 papers in this book. The final chapter, written by the editors, is entitled “Opportunities, Needs, and Strategic Direction in Research in Flocculation in Natural and Engineered Systems.” They review

the different elements of the papers presented by the contributors ending with the following statement:

“The contributors to the Workshop on Flocculation in Natural and Engineered Systems have provided herein some integral elements to advancing our understanding of flocculation processes; however, the work is only just begun. By integrating resources, expertise, and ideas, researchers will continue to advance our knowledge in this vitally important environmental, economic, and public health issue.”

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**Confined Space Entry and Emergency Response, D. Alan Veasey, Lisa Craft McCormick, Barbara M. Hilyer, Kenneth W. Oldfield, Sam Hansen, Theodore H. Krayer, Wiley Interscience, Hoboken, NJ (2006). (507 pages, US\$ 89.95, 8.5 in. × 11 in. format, soft cover, ISBN 0-471-77845-1).**

This book was written as a trainer's manual by the staff of the Workplace Safety Training Program at the University of Alabama at Birmingham.

Confined space entry is dangerous. The authors note that there were 670 fatalities in the 1980–1989 time period from asphyxiation, poisoning, and drowning. Of this number, 60 were rescuers. To emphasize the dangers noted above, the authors describe incidents that resulted in deaths in the prefaces of several chapters.

In the preface of this book, the authors describe its main features as follows:

“The book provides complete information, guidance, regulatory reference, and case studies for all personnel who plan for, supervise, work inside, or provide rescue from confined spaces. The reader is taken carefully through each step from the identification of confined spaces and their hazards, control of and protection from the hazards, equipment, and procedures for operations, to complete preparation for the rescue. A CD accompanies the book. On the CD the user will find materials for use in training, using this book as a textbook or reference. The CD includes learning objectives and lesson plans for each chapter, slide presentations for overhead transparencies or PowerPoint presentation, instructions for building and using confined space field simulators, worksheets for classroom hazard analysis and planning, and suggestions for hands-on practice with air monitoring equipment, personal

protective equipment, and entry and rescue equipment, such as ropes, webbing, harnesses, hardware, and portable anchor systems.”

I was impressed by the topic coverage. There are 15 well-written chapters comprehensively (in my opinion) describing the problem of confined space entry, including its dangers and the safe methods of carrying out work and/or rescue efforts. The chapter titles are as follows:

1. Introduction to confined spaces.
2. Regulatory and administrative aspects of confined space entry and rescue.
3. Identifying confined space hazards.
4. Air monitoring in confined spaces.
5. The entry permit.
6. Controlling confined space hazards.
7. Respiratory protection.
8. Chemical protective clothing.
9. Personal safety equipment.
10. Safe use of personal protective equipment.
11. Ropes, webbing, harnesses, and hardware.
12. Tying knots.
13. Rigging and using basic systems for confined space operations.
14. Making entry safely.
15. Overview of confined space rescue.
16. Rescue team organization and management.
17. Rigging and using rescue systems.
18. Packaging and transferring patients for confined space rescue.

One can see from the chapter list that confined space entry is comprehensively covered. I was impressed by (among other things) the discussion of air monitoring in confined spaces; instrument use is thoroughly discussed. Examples of permits for confined space entry and hot work are included.

Respiratory protection is discussed. Included is information on self-contained breathing apparatus (SCBA), supplied air, gas and vapor (cartridge) respirator, respiratory fitting, testing, maintenance, repair, and cleaning.

The final section of the book deals with the results of not following the safe procedures outlined in the first 15 chapters—and that is rescue.

My only concern for the contents of this book is minor; that is the number references, or the lack of thereof, to the chemical hazard literature. There are very few references cited in spite of the fact that there are many books containing chemical hazard data that could have been referenced. The foregoing comment is not to say that chemical hazards are neglected in the text. They are discussed in Chapter 3 but are not well referenced to the literature.

In summary, I thoroughly enjoyed reviewing this book and the accompanying CD. I strongly recommend it to anyone involved in confined space entry at the operational or training level.