The authors do not simply provide discussions of the numerous gasification processes. They go well beyond this to review gas cleanup systems (particulates, SO_2 and NO_2) as well as provide a list of technology suppliers for the aforementioned removal systems.

I was impressed by the amount of information provided in numerous fact-filled tables in Chapter 2: (1) gasification technology suppliers, (2) typical syngas composition, (3) manufacturers of gas cleanup systems, (4) summary of key characteristics of gasification technologies (6 pp.), (5) calorific value and compositions of syngas (3 pp.), (6) desirable syngas characteristics for different applications based on current technology and limitations (2 pp.), (7) partial listing of coal-based IGCC projects worldwide (3 pp.) and (8) gasification technology demonstration/pilot plant scale (30 pp.).

Gas cleanup, as noted above, is important to the production process. The topic is discussed in Chapter 5 and discussed very well, I might add. Indeed, this chapter is as well written as any text I have seen on air pollution control. Particulate removal systems are discussed first beginning with the simplistic gravity settling chamber and ending with condensation scrubbers. Equipment design, efficiency and costs are included for most systems. Following the discussion of particulate removal systems, gaseous pollutant treatment is reviewed. Packed towers, impingement plate/tray scrubbers and fiber bed scrubbers also are discussed. Much efficiency and cost data are reported.

Indeed, the whole book is resplendent with cost data and analysis of the operation and advantages of the systems reviewed.

I can do no better in describing the book's content than to repeat a synopsis found on the back cover. It reads:

> "*Gasification Technologies*: *A Primer for Engineers and Scientists* discusses gasification techniques and the benefits of each technology, including gas clean-up technologies and those used in hybrid systems and fuel cells. It also accounts for the primary products that are recovered and explains how these products are purified and can be used as fuel or for applications in petrochemical processes. The book describes the conditions in which optimal value intermediate products can be recovered, focusing on key factors such as oxygen and air blown reactors, operating temperature, internal and external heating, and reactor design. The authors also establish how gasificatin can help meet renewable energy targets, address concerns about global warming, and contribute to achieving Kyoto Protocol commitments."

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Cyanide in Water and Soil: Chemistry, Risk, and Management, D.A. Dzombak, R.S. Ghosh, G.M. Wong-Chong (Eds.). CRC/Taylor & Francis Group, Boca Raton, FL (2006). 614 pp., US$ 169.95, ISBN: 1-56670-666-1

Cyanide is a potent human toxin (with its most toxic form, HCN, being infamous). That aside, cyanides are used extensively in gold mining and electroplating. In the latter application, solutions of metal cyanides are employed in baths into which metals are dipped to be coated. Additionally, cyanides are produced as by-products by a number of industrial processes such as coal coking and gasification, iron and steel manufacturing, aluminum manufacturing and petroleum refining. In addition, there are natural (plant) sources. The complexity of the compound as well as its inherent toxicity poses challenges to its treatment.

In this book, the editors have brought ". . .together current knowledge and information about cyanide release to and behavior in the environment. . ." They review control of releases and remediation of contaminated sites. In my opinion, they have done this exceedingly well. Thirty-five different authors have contributed 27 chapters, many of which include the editors as participating authors.

Chapter titles are as follows:

1. Introduction.
2. Physical and Chemical Forms of Cyanide.
3. Natural Sources of Cyanide.
4. Manufacture and the Use of Cyanide.
5. Physical-Chemical Properties and Reactivity of Cyanide in Water and Soil.
6. Biological Transformation of Cyanide in Water and Soil.
7. Analysis of Cyanide in Water.
8. Analysis of Cyanide in Solids and Semi-Solids.
9. Fate and Transport of Anthropogenic Cyanide in Surface Water.
10. Fate and Transport of Anthropogenic Cyanide in Soil and Groundwater.
11. Anthropogenic Cyanide in the Marine Environment.
12. Cyanide Cycle in Nature.
13. Human Toxicology of Cyanide.
14. Aquatic Toxicity of Cyanide.
15. Toxicity of Cyanide to Aquatic-Dependent Wildlife.
16. Human Health Risk Assessment of cyanide in Water and Soil.
17. Ecological Risk Assessment of Cyanide in Water and Soil.
18. Regulation of Cyanide in Water and Soil.
19. Cyanide Treatment Technology: Overview.
20. Ambient Temperature Oxidation Technologies for Treatment of Cyanide.
21. Separation Technologies for Treatment of Cyanide.
22. Thermal and High Temperature Oxidation Technologies for Treatment of Cyanide.
23. Microbiological Technologies for Treatment of Cyanide.
24. Cyanide Phytoremediation.

25. Management of Cyanide in Municipal Wastewaters.
26. Management of Cyanide in Industrial process Wastewaters.
27. Cyanide Management in Groundwater and Soil.

To say the least, coverage is comprehensive. Cyanide, its problems and solutions and thereto, is well discussed (and very well referenced, with approximately 60 references per chapter; numerous of these references are to the editors' own published works). Although the early chapters in the book that describe the sources, problems and fate of cyanide in the environment were of interest to me, I (as an engineer) was more interested in the treatment process aspects discussed later in the book. Chapter 18, for example, reviews the regulation of cyanide in water and in soil (in this chapter, all three editors collaborated with two colleagues in the writing process). Allowable concentrations of cyanide in the water (drinking, surface, groundwater, and effluents) soils and wastes were thoroughly reviewed from the United States perspective mainly; however, selected international standards were reported in a few places in this chapter.

Given that I consulted on industrial wastewater problems as well as hazardous chemical spills and the disposal of hazardous wastes, it is not surprising that I found Chapters 19–27 of particular interest.

Cyanide treatment is discussed in a short overview in the first of these chapters. Reviewed are: waste characteristics, cyanide content of wastes, waste matrix, other constituents of concern, treated waste quality requirement and cost.

The serious discussion of treatment processes begins with Chapter 20. Discussed are treatment processes: (1) alkaline chlorination technologies, (2) oxidation technologies with ozone and hydrogen peroxide, (3) photocatalytic oxidation technology and (4) INCO's air/SO_2 process. Each of the foregoing sub-chapters discussing treatment processes had the following sections: process description and implementation, achievable treatment levels, design considerations, cost of technology and technology status.

Chapter 22, entitled "Thermal and High Temperature Technologies for the Treatment of Cyanide," follows the same format as Chapter 20. The six treatment technologies described were: (1) high temperature alkaline hydrolysis, (2) high temperature alkaline chlorination, (3) incineration/thermal treatment, (4) electrolytic decomposition or oxidation, (5) polysulfide process and (6) wet oxidation.

I thoroughly enjoyed reviewing this book. It is well written and, to say the least, extremely comprehensive in the discussion of cyanide problems and solutions.

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Waste Treatment in the Process Industries, L.K. Wang, Yung-Tse Hung, H.H. Lo, C. Yapijakis (Eds.). CRC/Taylor & Francis Group, Boca Raton, FL (2006). 647 pp., US$ 129.95, ISBN: 0-8493-7233-X

Waste treatment is an ever changing, increasingly important sphere of industrial production problems. This book addresses the topic initially in general terms in the first four chapters and in specific terms in the last nine chapters.

While the latter chapters are industry-specific, the initial chapters are general in nature. Their titles are as follows:

- Implementation of industrial ecology for industrial hazardous waste management.
- Bioassay of industrial and waste pollutants.
- In-plant management and disposal of industrial hazardous substances.
- Application of biotechnology for industrial waste treatment.

As noted above, the bulk of the book is devoted, chapter by chapter, to single industries. In each chapter, the authors describe the wastes (liquid, mainly) produced by that industry. Process flow diagrams, lists of types and amounts of wastes, and treatment schemes are described for each of the following industrial operations:

- Pharmaceutical.
- Oil field and refinery.
- Soap and detergent.
- Textile.
- Phosphate.
- Pulp and paper.
- Pesticide.
- Rubber.
- Power.

Of the above chapters, I found the chapter dealing with pharmaceutical wastes of most interest, not the least because the authors included 17 worked example problems and 14 unworked problems for student exercises (with answers given). Unfortunately, none of the other chapters followed this format which I have to admit impressed me because of my teaching background.

That criticism aside, I must commend the authors for an interesting and well written book that contains a plethora of data on industrial wastes and the treatment processes thereof as described by the press release accompanying the book:

"The book contains in-depth discussions of environmental pollution sources, waste characteristics, control technologies, management strategies, facility innovations, process alternatives, costs, case histories, effluent standards, and future trends for the process industry."