

prevent ignition completely. Nitrogen, carbon dioxide, and water vapor are often used. Metal dusts of magnesium, titanium and zirconium can be inerted by a noble gas such as argon.

Of more potential hazard than unusual deflagration, consider detonation which is a wave travel at or over the speed of sound in the unburned medium. A pressure shock front leads the action of the flame front, often abbreviated as DDT. Vapor cloud explosions (VCEs) can be extremely disastrous events, and may be prevented by avoidance of massive releases of flammables. Another term often cited is boiling liquid expanding vapor explosions (BLEVE), due to sudden loss of containment of a liquid above its normal boiling point. In addition to the vapor cloud created by the BLEVE, a substantial amount of the unevaporated liquid goes into the air as a fine mist. A graph clearly shows the ideal blast wave overpressure versus scaled distance. Reference is made to NFPA 325M, the most complete tabulation of flammable limits.

As mentioned before, inert gases may be used to suppress the flash. Nitrogen is often used, but will react with metal dusts, such as magnesium. Care must be taken if water vapor concentration, or in some cases, carbon dioxide, serves as an oxidizer or release of hydrogen gas. Argon is used instead in such cases.

Flame mitigation inside equipment includes methods that can mitigate the effects of explosions, such as (1) pressure relief with flame ejection; (2) isolation with or without flame ejection; (3) pressure containment; (4) suppression. Venting may be considered for deflagration in a closed process vessel or by low-strength enclosures. A single vent may be located near the middle of an enclosure, with other vents along the longest dimensions of enclosure. Four pages of references conclude the book.

This book is certainly a classic in its field, and it is hoped it will receive wide and serious readership on behalf of chemical plant safety. The CCPS is to be congratulated for this effort in the public, as well as the profession's interest.

HOWARD H. FAWCETT

*OSHA Compliance and Management Handbook*, by C.C.K. Wang, Noyes Data Corp., Park Ridge, NJ, 1993, 456 pages, price US\$ 72.00, ISBN 0-8155-1334-8

The author states he wrote this handbook with two purposes: (1) to help managers comply with standards, rules and regulations of the Occupational Health and Safety Administration (OSHA); (2) to show how occupational safety and health issues can be managed for organizational results.

The handbook provides the following information: ● general information on the organization and working of OSHA; ● in-depth specifics on OSHA standards and procedures; ● how to decipher OSHA in particular and occupational health and safety in general.

This book is written 'from a multi-disciplinary viewpoint' which is not surprising since the author has degrees in chemical engineering, economics, business and law, as it well should be for the field of occupational safety and health draws its information from many different fields of knowledge.

The book has 18 chapters (see below) and 4 appendices (index of references, cases cited, Code of Federal Regulations and Citation plus the US Code and Other Statutes):

1. Introduction
2. How OSHA obtained its standards
3. The employer's duty to Comply
4. General theory of control technology
5. Theories of motivation for safety and health
6. Recordkeeping under OSHA
7. Training and hazard communication
8. Safety under OSHA
9. Industrial hygiene under OSHA
10. How to preempt OSHA before OSHA knocks
11. How OSHA enforces its standards
12. How to manage an OSHA inspection
13. How to settle an OSHA citation
14. How to challenge an OSHA citation
15. Litigating with OSHA
16. Going beyond OSHA
17. Other matters related to OSHA
18. Conclusions

GARY F. BENNETT

*Current and Potential Future Industrial Practices for Reducing and Controlling Volatile Organic Compounds*, by N. Mukhopadhyay and E.C. Moretti, American Institute of Chemical Engineers (AIChE) Center for Waste Reduction Technologies, New York, NY, 1993, 60 pages, price US\$ 55.00, ISBN 0-8169-0615-7

This new study by the AIChE Center for Waste Reduction Technologies examines the impact that seven system technologies are expected to have on reducing volatile organic compounds (VOCs) during the next decade. This relatively short but very good book has eight chapters:

1. Introduction — to CWRT, the Clean Air Act and the book.
2. VOC characteristics — definitions, impact (on the environment), and the US EPA's list of more than 300 VOCs.
3. General description of VOC technology — for this reviewer at least, the real beginning of the book. Described are seven standard technologies: thermal oxidizers, catalytic oxidizers, flame/boiler/process heaters, absorbers and condensers; then relatively new (but commercially available) technologies; biofilters, membrane separations and ultraviolet oxidizers; and pilot scale technologies, corona destructive reactors and plasma technology devices.
4. VOC air regulations — la raison d'être: Clean Air Act, Clean Air Act Amendments, hazardous air pollutants, ozone protection, RCRA, EPCRA and state and local regulations.