

caused deaths of numerous innocent people. Each of these major events has caused much public concern and increased scrutiny of the chemical industry. Ergo, the importance of the topic "Risk Management."

Thus there is a crucial need for risk managers to meet tightened safety regulations, to seek more informed risk management techniques and to adopt formal risk management systems. The authors note, "... the subject of risk management has been steadily gaining prominence in the last 25 years." There is a requirement to meet the Common Law Duty of Care as well as, for commercial reasons, minimizing production interruption. Early in the book, the authors discuss the nature and role of management in the above processes, which they say, at the very least, includes these tasks:

- risk assessment (analysis and evaluation);
- risk treatment (elimination, mitigation, transfer);
- risk acceptance (tolerability/acceptability criteria);
- risk communication (information sharing with stakeholders);
- risk monitoring (auditing, evaluation, compliance).

The main risk categories in chemical processes include:

- occupational risks (safety and health of employees);
- plant property loss;
- environmental risks (safety and health of public, biosphere, heritage);
- liability risks (public, product, failure to provide service, legal prosecution);
- business interruption risks;
- project risks (design, contract, delivery).

An early table in the book lists selected major chemical incidents. The table begins with data on an ammonium nitrate explosion in Oppau, Germany, in 1921 when 561 deaths occurred. More than 40 more incidents are tabled ending with a report about a natural gas explosion and fire in Skikda, Algeria, in 2004; there were 27 deaths and 72 injuries.

Risk management is defined by the authors as:

"... a vital systems activity across design, implementation and operations phases of a process system. This integrative systems perspective is often missing or poorly emphasized in much of the risk management literature. The purpose of this volume is to present a holistic approach to process risk management that is firmly grounded in systems engineering employing a life cycle comprehensive 'cradle to the grave' approach."

The authors cover the topic clearly and extensively in the following 15 well-written chapters, much of which has been utilized in their short course as well as in a course taught by one of the authors at the University of Queensland, Australia:

- (3) system models for risk management;
- (4) identifying hazards and operational problems;
- (5) analysing the consequences of incidents;
- (6) effect models for consequence analysis;
- (7) vulnerability models;
- (8) estimating the likelihood of incidents;
- (9) risk estimation;
- (10) decision making under uncertainty;
- (11) process safety management systems;
- (12) 12 life cycle risk management tools;
- (13) management of major hazard facilities;
- (14) auditing process safety management systems;
- (15) land use planning risk management.

The authors write clearly, concisely and authoritatively including numerous excellent examples to illustrate their points.

They end each chapter with a review of the material just covered. Noted in the book is the existence of a website that the authors say has a full presentation of material supplemental to the text.

The book should be extremely useful not only to industrial practitioners but also to regulatory officials and university faculty.

Gary F. Bennett*

University of Toledo, Department of Chemical and Environmental Engineering, Mail Stop 305, Toledo, OH 43606-3390, USA

* Tel.: +1 419 531 1322; fax: +1 419 530 8086.

E-mail address: gbenett@eng.utoledo.edu

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Carlos A.M. Afonso, Joao G. Crespo (Eds.), Green Separation Processes: Fundamentals and Applications, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2005, 382 pages, US\$ 180.00, ISBN 3-527-30985-3.

Sustainability and Green Chemistry are two topics appearing routinely in the literature. This book adds to that process in a very useful way. Thirty-five authors from nine different countries contributed to this very timely technical discussion of the topic.

James Clark (University of York, UK) begins the first chapter with a definition of the term: "Green Chemistry is the universally accepted term to describe the movement towards more environmentally acceptable processes and products." Green Chemistry, Clark notes, was "... coined by staff at the U.S. EPA in the 1990s" The use of this term "... helped to bring focus to an increasing interest in developing environmentally friendly chemical processes and products."

- (1) managing risks from process systems;
- (2) risk—estimation, presentation and perception;

The book is divided into three major sections of different lengths:

1. Green Chemistry for sustainable development.
2. New synthetic methodologies and the demand for adequate separation processes.
3. New developments in separation processes.

The book moves from the general (Part 1) to the technical (Part 2). Part 2 has three chapters entitled:

1. Microreactor technology for organic synthesis.
2. Solventless reactions.
3. Combinatorial Chemistry on solid phases.

In the first chapter of this section, the authors note:

“We first describe some characteristic key features of microreactors. Secondly we outline a shortcut regarding the fabrication of various types of microreactors and then we present some selected examples from the growing number of exciting applications in organic synthesis. We subsequently discuss the capabilities offered by microstructured devices for the work-up of reaction mixtures today. Finally, we complete the survey with the discussion of how microreactors will contribute to a greener chemistry and a reflection of the bottlenecks limiting the widespread use of microreaction technology.”

In Chapter 2 of this section, we find this comment on solventless reactions:

“To encompass these basic principles, the number of publications related to green chemistry and engineering has grown rapidly in the past decade, featuring such aspects as solventless (dry media), solid supported and solid/solid reactions, the use of room temperature and ionic liquids, supercritical carbon dioxide, and water as alternative reaction media combined with microwave irradiation, fluorosolvents, and catalysis.”

The final chapter in this section (Combinatorial Chemistry on solid phases) is a fundamental technique based on polymeric resin beads to which a reactant is covalently bonded.

The final, and longest section, of the book deals with green separation processes. The first chapter in this section is a general introduction to the topic. It was written by Richard D. Noble of the University of Colorado, Boulder, CO. He notes in his concluding paragraph that:

“A general understanding of separations facilitates the development of entirely new methods of separation. Insight into the capabilities of a variety of methods helps us to identify when the ability to separate will pose a major process limit. An understanding of solution and complexation chemistry makes it possible to identify and select among the potential mass separating agents for different applications and to transfer the use of particular agents and

chemical functionalities among different types of separation processes.”

Following Noble's introduction, there several well-written, technical chapters, each dealing with a specific separation process. These chapters discuss: distillation, green enantiomeric separations by inclusion complexation, chromatography: a non-analytical view, fluid extraction, membrane processes, nanostructures and separation, and separations using superheated water.

The book ends with this final thought by the editors: “To conclude, we believe that Chemistry will have a central role in the transition towards a sustainable, competitive and knowledge-based economy and society. In combination with its own supplier and downstream sectors it may contribute decisively to improved economic and social welfare.”

Gary F. Bennett*

University of Toledo, Department of Chemical and Environmental Engineering, Mail Stop 305, Toledo, OH 43606-3390, United States

*Tel.: +1 419 531 1322; fax: +1 419 530 8086.

E-mail address: gbennett@eng.utoledo.edu

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Stephen A. Bortone (Ed.), Estuarine Indicators, CRC Press, Boca Raton, FL, 2005, 553 pages, US\$ 129.95, UK£ 74.95, ISBN 0-8493-2822-5.

This book is the 26th in CRC's Marine Science Series which “. . . is dedicated to providing state-of-the-art coverage on important topics in marine biology, marine chemistry, marine geology and physical oceanography.” This current book compliments its predecessors in the series.

This book is based on the chapter authors' contributions presented at the Estuarine Indicators Workshop held on Sanibel Island in October 2003. The submitted manuscripts were technically reviewed before publication.

The book contains 31 papers authored by 90 scientists. The first paper is authored by Bortone who writes:

“Some of the chapters offer presentation on the application and effectiveness of estuarine indicators currently used by research scientists. Other chapters present documented arguments for the future consideration of indicators not previously considered nor generally accepted as estuarine indicators. Still other chapters offer insight into the overall role that estuarine indicators play in estuarine management decisions, now and in the future. The chapters are arranged to lead the reader to fully appreciate the need, problems, complexity, breadth, and application of estuarine indicators. Although each chapter contains elements of each of these features, the