

references. This volume is highly recommended as a reference to the subject, which still needs much more attention and control.

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Bretherick's Handbook of Reactive Chemical Hazards, 5th Edition. P G Urhen (Ed.). Butterworth-Heinemann, Oxford, 1995. Vol. 1: xxvi + 2004p. Vol. 2: xx + 407p. UK £150. ISBN: 0-7506-1557-5.

“It happens, like as not,
There’s an explosion and good-bye the pot!
I’ve no idea why the thing went wrong;
Recriminations though were hot and strong.
‘Well’, said my lord, ‘there’s nothing more to do.
I’ll note these dangers for another brew;
Don’t be alarmed, help to sweep the floor
Just as we always do, and try once more.’”
(extract from “The Canon Yeoman’s Tale” from “The Canterbury Tales” by Geoffrey Chaucer, 1386. Translated by Neville Coghill).

Six hundred years later the Canon Yeoman could have consulted Bretherick (as the handbook is colloquially referred to by chemists, it being by now such a well known and recognised work) for information. Or if the Canon Yeoman’s experience was unique he could have contributed to the accumulated knowledge in Bretherick by sending his carefully noted dangers as an “additional contribution” in response to the editor’s and publishers active encouragement of users of the book to participate in increasing the (already monumental) scope of its coverage of chemical reaction hazards as a service to their fellow workers in chemistry. Much of the material in the handbook has been collected in this way over the years.

As Trevor Kletz says in his foreword “Those of us who have been working in the safety field for many years have seen the same accidents repeat themselves with distressing regularity. We welcome, therefore, every attempt to bring together scattered information on any aspect of safety and make it readily available”.

As a preparative chemist Leslie Bretherick was aware during his early career of a general lack of information relevant to the reactive hazards associated with the use of chemicals, but it was as the result of a well publicised incident in the mid-1960s, which was a repeat of one which had occurred 16 years earlier, that he recognised that the then currently existing arrangements for communicating “well known” reactive chemical hazards to practising chemists and students were largely inadequate and he recognised that his handbook needed to be compiled. Leslie Bretherick produced a masterly summary of available information on reactive chemicals and their reactions working almost unaided and largely in his spare time at least for the first edition. And the rest as they say is history. Sadly Leslie Bretherick has had to withdraw from compilation now

because of failing sight, but the bulk remains his work and will do so for several editions to come. Now that he has retired a team of editors, led by Peter Urben of Couraulds has carried on the good work, increasing the length of the book by about 7% and maintaining the same high standard.

Bretherick's handbook remains broadly similar to the previous editions: volume 1 contains specific chemicals entries, and volume 2 contains general group entries, but readers will note some changes. There are, of course, some hundreds of additional entries and much supplementary information in existing entries. More immediately apparent, if less important, may be the change in the cyclic structures shown – these are now drawn in a more contemporary notation. The book is available now also as an electronic database (on CD-ROM or a set of 3.5 inch floppy disks at a price of £395 + VAT each, a demonstration disk is available) with all the improved ease that brings of searching for cross-references or related materials. In future, it is proposed to supplement this rather more frequently than the new editions of the book will appear.

The handbook includes all information which had become available to the editors by January 1994 on the reactivity hazards of individual elements or compounds, either alone or in combination. Appropriate source references are included to give access to more expansive information than that compressed into the necessarily abbreviated text entries. A wide variety of possible sources of published information has been scanned to ensure maximum coverage. Information on toxic hazards has been specifically excluded because it is available elsewhere in many well-ordered and readily usable forms.

The handbook is easy to use, with helpful guides inside the front and back covers, and interesting to just browse through.

One of the major challenges facing the chemical industry is its poor public image (evidenced by the Chemical Industries Association's published surveys on the topic). One of the main problems is a continuing sequence of fires, explosions, exothermic runaways and accidental releases. All chemical reactions implicitly involve energy changes, for these are the driving forces. The majority of reactions liberate energy as heat and are termed exothermic. All reaction hazards involve the release of energy in quantities or at rates too high to be absorbed by the immediate environment of the reacting system, and injuries and/or material damage result. A review of incidents over the last 30 years involving exothermic runaway reactions in batch reactors shows that a recurring prime cause (accounting for at least 20% of incidents) is an inadequate understanding of the process chemistry and thermochemistry, i.e. the reaction hazards. In order to deal with reaction hazards it is first necessary to identify them. A formal system of assessment should be adopted to identify and record the hazards and the methods chosen to ensure safe operation. There is no standard procedure for evaluating chemical reaction hazards but the main procedures should always include as a first step recourse to the literature data and that is where Bretherick is such an invaluable source of information.

Possession and use of the handbook are a must for any establishment involved in preparative chemistry, including school, college, and university teaching laboratories and industry, and for others, including safety officers and emergency service personnel, involved in a more general way with the storage, handling, packing, transport and distribution of chemicals, or emergencies related thereto. Use of the information can

help to reduce the occurrence of incidents, to save lives, and to prevent injuries and material damage.

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Safety, Systems and People, by Sue Cox and Tom Cox, Butterworth–Hienemann, Oxford, 1996, £30.00, 339 pp. ISBN: 0-7506-2089-7

This book presents a treatment of safety management based on a systems approach; it explores the theory and practical implications of such an approach. Intertwining the authors' general approach to systems theory is a belief in the need to integrate the design and management of safety related hardware and software with the management of people—hence the title; *Safety, Systems and People*. The authors give a thorough review of the psychological and organizational factors and the processes underpinning the effective management of safety at work. However the approach is sufficiently broad to cover the management of work related activity that has implication for the health and safety of the public and the environment.

The book is divided into three parts. Part 1 provides the background and justification for a quality approach to managing safety. It introduces the main concepts and reviews existing approaches to safety management and models of accident causation. This leads to the conclusion that a general systems approach to safety management is needed. Part 1 comprises the following chapters:

1. Why manage safety?
2. Hazard, harm and risk: the basic equation
3. Safety science and safety management

Part 2 focuses on the psychology of safety and a systems model based on three components: the organization, the job, and the person. This approach has been recommended by the UK Health and Safety Executive. The discussion encompasses recent developments such as complexity theory. The issue of organizational culture is treated with a healthy degree of scepticism supported by the findings from empirical studies. The individual is treated as an active information processor. Five chapters cover:

4. A systems framework for the management of safety
5. The organization
6. Jobs and tasks
7. The person
8. Work-related stress