mathematics of resource engineering—very much a chapter for chemical engineers. The pharmaceutical and agrochemical industries are represented by chapters on rodenticides and salicylates. The former informs us that an adult rat produces 30 000 droppings per annum and 8 litres of urine, hence the need for rodenticides; and the latter begins with Hippocrates' use of willow bark for the treatment of pain and fever and proceeds through a discussion of the production, use and toxicology of modern salicylates. There is also a chapter on saponins which is the best introduction to this biologically interesting group of compounds. Finally there are short chapters on seasonings (most of the information is carried in an earlier chapter on flavours and fragrances), sedatives, selenium and its compounds, shoe polishes, and a somewhat longer chapter on semiconductors. This chapter is disappointing because there is very little chemistry and no mention of recent advances (high temperature conductors etc.).

Volume A24 begins with (inorganic) silicon compounds and ends with (microscopic) stains. The first chapter (93 pages) completes the coverage of silicon compounds commenced in volume 23, and other mammoth chapters are also concerned with inorganic chemistry: silver and its compounds (55 pages) and sodium and its compounds (100 pages). In between these chapters, the cosmetic industry receives wide coverage with chapters on skin cosmetics and soaps. The latter includes a lot of engineering information. Pharmacologically interesting compounds are discussed in chapters on skeletal muscle relaxants and spasmolytics, and as usual a comprehensive list of drugs complete with key physical data is provided. A timely survey of single cell protein types and their manufacture is welcome, especially since (as stated) 10% of the world's population of five billion persons are undernourished. Finally there are excellent chapters on solar technology (full of practical information), solvents (with comprehensive lists and tables of physical properties), and microscopic stains (again with excellent tables of names and physical properties).

It hardly need stating that every major organisation where industrial chemistry is taught or practised should have these (and previous) volumes in their libraries. At £220 each they are well beyond the reach of individuals, but no (industrial) chemist should be denied the joy of browsing through and learning from this encyclopedia.

John Mann

Catalytic Selective Oxidation. Edited by S. T. Oyama and J. W. Hightower. Proceedings of the CS Symposium Series No. 523. 1993. 464 pp. ISBN 0-8412-2637-7.

The invitation to review the published proceedings of a symposium can elicit very different reactions. Anyone active in research knows well that many such publications are now full of drivel, being seen by some authors as an opportunity too good to miss, an occasion to chalk up yet another publication of essentially the same work, written in a different format. Whether this situation arises through pressure to publish from the author's viewpoint, or from the desire of the publishers to maximise profits, is immaterial. The final result diminishes and devalues published research, and lowers the expectation of readers of such proceedings. If there is a solution to this growing problem, it is not obvious to this reviewer, especially since it is also becoming common practice for funding bodies to only support attendance at a conference if a paper is presented. If it so happens that the proceedings of the conference are to be published, the present sorry state of affairs becomes almost unavoidable. There is far too much rubbish being published in the so-called academic literature and it really is time that something was done about this.

The ACS Symposium Series is an honourable exception to this trend and it is a pleasure to find that the present issue contains a significant number of high quality papers covering a wide range of related topics in catalytic selective oxidation. It is highly significant that the policy of the ACS with regard to the publication of a symposium is very clearly defined and based on high academic standards. Papers can be excluded because they are not appropriate to the topic of the symposium, and others are added to broaden the scope. All papers are reviewed anonymously, and only original research papers and occasional review papers are accepted. This should be compared with the growing practice at conferences of participants being handed one or more papers to 'referee', with the clear indication that a response before the end of the meeting would be appreciated.

No system is perfect, but the ACS deserve credit for at least trying to maintain high standards, even if they have occasionally been somewhat let down by referees in this particular case. Thus, although it would be hard to find a paper which is a 'verbatim reproduction of a previously published paper', there are a number which have the familiar feel of an old pair of slippers—they are comfortable, easy to get on with, and have been around for a while. None of the papers are bad, but some are gentle extensions of previously published works by the same authors. Such papers do wonders for the researchers' publication record, are incredibly easy to read and assimilate, but in the end contribute little to the real advancement of knowledge.

By and large the production of the book is good, but in my copy there is an unfortunate transposition of pages nine and eleven, and there are a number of interesting forms of spelling, some of which may be American, but 'derth' as in 'derth of knowledge' sounds like 'Star Wars-speak', and the terminology data *is* brings this reviewer out in spots.

Turning to the contents of the book, one finds that the contributions are nicely balanced, covering theoretical aspects of selective oxidation, studies of single crystals and well-defined crystal faces, characterisation of oxidation catalysts, the synthesis and reactivity of new materials, the activation and selective oxidation of lower alkanes, and, finally, state-of-the-art engineering

concepts in selective oxidation. In total there are 34 papers, averaging apparently 14 tightly packed pages each. It would be pointless, although it is often done by reviewers, to merely list the contents of this book as if this somehow produced a review. It seems more useful to ask whether this book justifies a place on a shelf. The answer depends on what you wish to know. If the reader is already an expert in one aspect of selective oxidation, it may prove irritating because only a few papers will be directly relevant and these may not have very much new to say. On the other hand, if the reader has a more general interest in the subject and whishes to be updated on recent developments in the field then there is much this book which is worth reading. It provides a good overview of selective oxidation, and would be an ideal book to give to a postgraduate student in order to provide a good starting point for getting in touch with the relevant literature.

The articles I found most useful and interesting reflect these feelings, namely that the real value of a book like this is not found by reading the papers on the parts of the subject with which one is very familiar, but by perusing those which are on the peripheries of ones interests. Perhaps it is experience, or old age—the two are related—which teaches this important lesson, namely, that a short contact with an unfamiliar subject just might provide a much greater stimulus than a similar amount of contact with a familiar topic. It takes a long time before one has the self-confidence, or perhaps arrogance, at a large conference to deliberately choose not to attend the plenary lectures given by ones own eminent colleagues, but instead to attend a parallel session on a new subject. This is the approach to adopt with this publication. It contains a large proportion of high quality papers. Read those which are on topics with which you are less familar and I would be surprised if you did not gain some real benefit. This book is worth purchasing if you have any interest in catalytic selective oxidation. It will serve as a valuable resource for some considerable time. Well done the editors and the ACS!

R. Burch

The Technology of Extrusion Cooking. Edited by N. D. Frame. Blackie Academic & Professional, Glasgow. 1994. 253 pp. ISBN 0 7514 0090 4. Price: £65.

This book is aimed at technologists, engineers, managers and product development staff working in the food industry who are either using, or may have an interest in using, extrusion cooking. It takes the form of a handbook, providing information on the use of extrusion for specific categories of product including breakfast cereals, snack foods, petfoods and fishfoods, confectionery and brewing. The book concentrates on the use of twin screw, co-rotating, intermeshing extruders. Other types of extruder are considered and the advantages and limitations of the twin-screw extruder are noted in each product category. Emphasis is placed on the latest applications of twin-screw extrusion, and it is intended that the material presented will stimulate further development of extrusion cooking, and increase the range of applications.

The book comprises seven chapters, each by a different author. The authors are from industry and research institutes in both the UK and USA. Each chapter has a reference section and the book as a whole is indexed. While the first two chapters provide an overview of extrusion in terms of operational characteristics and raw materials, the remaining five chapters are product-specific.

The first chapter is written by the editor and is concerned with the operational characteristics of the co-rotating twin-screw extruder. This chapter provides an excellent overview of the types of extruder available and the terminology used. Case studies are provided and a short but useful glossary is given at the end of the chapter.

Chapter Two considers the raw materials for extrusion processes. This chapter classifies raw materials into six functional groups: structure forming materials, dispersed phase-filling materials, plasticisers and lubricants, nucleating reagents, flavouring agents and colouring agents. It is noted that all materials possess more than one functional effect, but that usually one effect is dominant. Each functional group is then discussed.

A comprehensive reference section is given at the end of this chapter.

The third chapter describes breakfast cereal extrusion technology. Breakfast cereal production is one of the most widespread applications of extrusion technology; 15% of products are extruded. An overview of the US breakfast cereal market is given and a breakdown of the general composition of breakfast cereal products. The effect of different combinations of shear, pressure, temperature, moisture and cooking time, on breakfast cereals is discussed.

Overall, extrusion cooking is noted to have become an indispensable part of breakfast cereal manufacture, in both replacing traditional methods and in becoming a unique way to manufacture a range of products.

Chapter four is concerned with snack food extrusion. The ingredients and equipment used are first reviewed. The products are then discussed under the categories of direct expanded products, co-extruded snacks and indirect expanded products. Die and cutter design for snack products are briefly covered and three case studies are given at the end of the chapter.

The fifth chapter is concerned with petfood and fish-food extrusion. This chapter first describes the selection of raw materials, typical formulations and the processing equipment used, and discusses the importance of providing optimum nutritional balance, functional properties and organoleptic characteristics at a low processing cost. Process variables and control, final product specifications and operating costs are discussed at the end of the chapter.