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.

Chapter Six evaluates confectionery extrusion. The introduction describes traditional confectionery processes as mostly consisting of essentially batch operations of long duration, based on the automation of hand work operations. A processing section then outlines the operations likely to be encountered in confectionery extrusion. The problems of flavouring extruded confectionery products are discussed. The advantages of using specific glucose syrups, gelling agents and starches in extrusion cooking are also considered. It is considered that extrusion cooking should replace traditional processes where there are clear economic, hygienic or technologic advantages. The main area of extrusion application in the confectionery industry is expected to be in the development of novel products.

The final chapter of the book discusses extrusion of brewers' hops. A brief outline of the brewing process is given. An extruder can be used as a reactor to facilitate the transformation of bittering precursors to bittering components and this process is described in full. It is thought that the extrusion process could add considerable value to the hop material, however the commercial viability of the process has still to be evaluated.

Each chapter of this book is self-contained, with few references to other parts of the book. However, there is only a small amount of overlap and this is particularly true in the area of raw materials and ancillary process equipment. The typeface and figure style is consistent throughout. All figures are very clear. The book includes a three page index which appears to be comprehensive.

This book is essential reading for everyone concerned with extrusion cooking and product and process development in the food industry. It is an extremely useful handbook on the application of extrusion to many areas of the food industry. It is concerned with up to date applications and will inspire further developments in the area.

Lisa Bates

Principles of Enzymology for the Food Sciences. By John R. Whitaker (2nd Edn). Dekker. 1993. ISBN 0-8247-9148-7. 64 pp. Price: $185.

This second edition of John Whitakers book provides an excellent and authoritative blend of general enzymology, with detailed discussions of selected groups of enzymes which are of relevance to the food scientist.

After introductory chapters covering the protein nature of enzymes and enzyme purification, the book covers active sites, rates of reactions and the effects of specific parameters on enzymic reaction, such as substrate and enzyme concentration, pH, temperature, cofactors and inhibitors. It is these chapters which set this text apart from the many others on offer, as they provide a particularly lucid and readable account of enzyme kinetics without sacrificing depth of coverage. The author has a talent for including the most pertinent information and there is much in this section that will be of value to all students of enzymology.

The remaining chapters cover a selection of groups of enzymes of relevance to the food scientist, such as the hydrolases (glycosidases, pectic enzymes, esterases, nucleases and proteases) and the oxidoreductases (lactate dehydrogenase, glucose oxidase, polyphenol oxidase, xanthine oxidase, catalase and peroxidase and lipoxygenase). These sections cover the reactions catalysed, properties of the enzyme, assay methods and inhibition characteristics of the enzyme.

Overall, the book is very well written and illustrated, and is well planned allowing for easy access to information. I would recommend this text to all teachers of enzymology and to any practising food scientist looking for a sound theoretical introduction to enzymes with a food flavour.

R. A. Rastall