

The final chapter on carbohydrates, by C. Buck, deals with glucose-transforming enzymes, such as glucose isomerase and the glucose oxidases. Current world production of high-fructose syrup amounts to some three million tonnes per annum, which gives an indication of the scale of glucose isomerase operations.

Extracellular microbial lipases and microbial proteinases are then reviewed by A. R. Macrae and O. P. Ward, respectively, with emphasis on their applications to industrial processes. In the case of lipases, this is a comparatively recent development, but with proteinases, there is a substantial literature going back to the work of Rohm and Haas in Germany before World War I.

The book is completed by a discussion of the regulation and process of secretion of enzymes by microorganisms written by F. G. Priest. The present knowledge of protein synthesis in extracellular enzyme-producing microorganisms has lagged behind that of other organisms, and the author has shown how recent molecular biological techniques have provided new information on the regulation and physiology of extracellular enzyme synthesis.

Overall, the book provides a timely survey of microbial enzymes of major industrial significance and can be strongly recommended.

D. J. Manners

Enzymes and Food Processing. Edited by G. G. Birch, N. Blakebrough and K. J. Parker. Applied Science Publishers Ltd, London. 1981. xii + 296 pp. Price: £26.00 (US\$48.25).

Enzymes and Food Processing represents the proceedings of the industry-university cooperation Symposium organised by the National College of Food Technology, University of Reading, UK. The 14 papers comprising this volume are contributed by different authors with specialised knowledge and expertise in the subject, and range in their coverage of the application of enzymes in processing from isolated substrate to complex products like meat, milk, fruit juices and bread. Health and safety aspects of detoxifying enzymes and analytical applications of enzymes are also discussed. The sources of enzymes, their

mode of action and technological aspects regarding the implication in industry are detailed comprehensively and are duly supported by illustrations and figures. Appropriate data from published literature have been included and lists of relevant references are given at the end of each paper.

Professors Shallenberger and Crook in their introductory and keynote papers have very rightly assessed the present and future status of enzyme applications in food processing and have emphasized the economic necessity of utilising substrate regarded as being either waste or outside the range of normal foodstuffs. Good examples of such are the recovery of waste proteins and the utilization of cellulose by adopting the new technologies projected for the future. The first three papers by Drs Norman, Bucke and Takasaki deal with enzymes and advancements made in enzyme technology for the preparation of sweeteners by hydrolysis of starch and isomerisation of D-glucose.

In other papers, authors have discussed the role of pectinases, cellulases and proteolytic enzymes in the clarification of fruit juices and in improving the quality of meat and milk by enhancing the flavour. Such enhancement is achieved via release of peptides and amino acids by proteolysis of proteins. The role of rennet in cheese making, particularly its role in the cheese ripening process, new potential developments in the renneting process and the impact of enzymic hydrolysis on recovery and uses of protein are explored by Drs Cheeseman and Petersen.

To provide a balance of topics between the application of enzymes in food processing and health and safety hazards arising from their continuous use in industry, Drs Farrow, Hudson and Nijpels, have made valuable contributions in this book by providing information regarding workers and organisers. The role of detoxifying enzymes, mainly lactase, has also been discussed in detail. In the last paper of this volume, Dr Wiseman has detailed the potential analytical applications of the enzymes both in batch analysis and in continuous monitoring of complex substances.

This volume with wide coverage of the subject is of significant importance to those actively involved in research and production of enzymes for use in food industry. The reviewers can recommend this volume not only to the established individual workers and food processing organisations but also to the teachers and students of bio-

technology, since it provides comprehensively basic information as well as data on the application and practical feasibility of processes.

The editors and organisers of the Symposium are to be congratulated on making a fruitful effort to compile the important and latest information on the subject in the form of a comprehensive book.

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S. S. Marwaha