medical devices, food processing, food science, petroleum processing, immunology, polymers, separation and purification, fermentation, and medical research.

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Immobilized Enzymes for Industrial Reactions, edited by R. A. MESSING, Academic Press, New York, San Francisco, and London, 1975, xiv+232 pages, $14.75, £10.50.

The title of this book is somewhat ambiguous in that the greatest proportion is devoted to the preparation and properties of immobilized enzymes rather than to an explanation of how to go about using immobilized enzymes to carry out reactions at the industrial level. The stated intent of the book is "to guide the engineer and scientist along the path toward the industrial application of immobilized enzymes". The work claims to be neither a comprehensive review of the literature on immobilized enzymes nor a basic text for enzyme chemistry and engineering. The book is, in fact, an amplified course for engineers and scientists on the production of immobilized enzymes and their application to industrial processing.

Following an introduction and general history of immobilized enzymes, a limited review of enzyme chemistry is presented. Subsequent chapters describe the derivatization of a variety of matrices, including glass for enzyme immobilization, and set out the principles involved in immobilization of adsorption, inorganic-bridge formation, covalent attachment, and entrapment. Separate chapters are devoted to a comparison of the characteristics of free and immobilized enzymes, and to immobilized co-enzymes. The penultimate chapter, on design and operation of immobilized-enzyme reactors, considers the importance of performance, mass transfer, electrostatics, heat transfer, pressure drop, and financial phenomena. The final chapter, on applications of immobilized enzymes, describes various viable and existing uses of immobilized enzymes.

The relevance of the book to carbohydrate chemists is the same as that in the foregoing review, and key words are: agarose, cellulose, dextran, starch, α-amylase, β-amylase, cellulase, α-D-galactosidase, glucoamylase, D-glucose isomerase, D-glucose oxidase, (invertase), (lactase), lysozyme, and pectinase.

Immobilized-enzyme technology is truly representative of a multidisciplinary science and, as for the other book, this book is relevant to a spectrum of professionals.

Although produced by a rapid, manuscript-reproduction process, the typewriter presentation of the book is clear and bold. The handy, not-too-large size will aid the commendation of the work as a useful handbook for teaching purposes, both

for student use and to answer enquiries by scientists and engineers not expert in the field.

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Carbohydrate Chemistry, Volume 9, J. S. BRIMACOMBE (Senior Reporter). A Specialist Periodical Report of the Chemical Society, London. 1977, xii+485 pages. £29.00. $58.00.

The series "Specialist Periodical Reports—Carbohydrate Chemistry" is coming towards the end of its first decade of publication, and in reviewing the latest edition, Volume 9, it is perhaps useful to comment also on the series as a whole.

Volume 9 covers the literature between mid-January 1975 and mid-January 1976. The coverage is comprehensive rather than selective. The extremely high standard of production apparent in earlier volumes is maintained: the continued, liberal use of formulae and reaction schemes is commendable.

As with all of the preceding volumes, Volume 9 comprises two parts. Part I (202 pages) covers mono-, di-, and tri-saccharides and their derivatives, and Part II (256 pages) deals with macromolecules. Each part is subdivided into chapters dealing with different classes of compounds; for example, Part I contains chapters on Free Sugars, Glycosides, Ethers and Anhydro Sugars, *etc.*, and also has chapters on such special topics as N.m.r. Spectroscopy and Conformational Features of Carbohydrates, Oxidation and Reduction, and Separatory and Analytical Methods. It is perhaps a reflection of the foresight of the reporters in Volume 1 that, during the nine years of publication, it has been necessary to add only one new chapter heading to Part I and one to Part II. The former, an addition to Volume 9, is entitled The Synthesis of Optically Active Non-Carbohydrate Compounds, and reflects the ever-increasing use by synthetic chemists of carbohydrates as sources of chirality. The addition to Part II of a chapter on Enzymes was made in Volume 3, and this chapter has undergone considerable expansion over the years; in the latest volume, it occupies 70 pages and provides 402 references towards the total of 1821 references to be found in Part II.

Volume 9 contains a total of 2759 references split between Parts I and II in the ratio of approximately 1:2. Comparing Volumes 1 and 9, the numbers of references in Parts I and II have increased by approximately 23 and 330%, respectively. Presumably, the latter figure does not represent solely the increase in research in this area, but also indicates a widening sphere of interest of the reporters. Even so, the number of Part-II references in the present volume is only three-quarters of that in Volume 6, which ranks as the largest edition so far with 591 pages and a total of 3330 references.