

beings, and gives some idea of the wonderfully complex activities within the yeast cell.

The sixteen chapters of this book cover taxonomy, ecology, yeast nutrition, morphology and cytology of yeast cells, its life cycle and metabolism, the “killer” phenomenon, molecular biology of the yeasts, spoilage yeasts and industrial yeasts. It also has special sections on membranes, genetics and molecular biology of methylotrophic yeasts, yeast in food fermentation and therapeutics, and yeast in the production of fuel-grade ethanol.

Each chapter provides a very interesting reference work of direct relevance for researchers in this field. This book is recommended to all libraries concerned with microbiology, biochemistry and molecular biology.

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***NMR of Polymers*, F.A. Bovey, P.A. Mirau, Academic Press, San Diego, 1996, pp. x + 459, Price \$85-00, ISBN 0-12-119765-4**

Nuclear Magnetic Resonance (NMR) spectroscopic techniques are of tremendous interest and importance for the observation of every aspect of the structure and properties of macromolecular substances. The current importance of NMR for the structural characterisation of synthetic and natural polymers can be visualised from the multitude of papers published in areas of polymer science that rely on NMR techniques for the elucidation of structural details. High resolution solution NMR has always played a key role in the determination of polymer microstructure and assisted in the understanding of polymerisation mechanisms, and the development of multidimensional NMR has facilitated more detailed understanding of polymer microstructure and detailed molecular level assignments of polymer dynamics. More recently, the development of solid-state NMR has allowed researchers to investigate the structure, conformation, organisation, and dynamics of polymers in their native state.

This volume aims to provide an overview of the applications of NMR to polymer characterisation, and begins with two excellent introductory chapters which detail the fundamentals of NMR, and the microstructure of polymer chains, respectively. The latter chapter discusses polymer chain structure in terms of regioisomerism, stereochemical configuration, geometrical isomerism, branching and cross-linking. This is of particular interest as peaks from the different microstructures can be resolved in the NMR spectrum,

providing a detailed and quantitative characterisation of chain microstructure.

The third chapter in this volume discusses the high resolution solution-state NMR of polymers, and includes multi-nuclear NMR studies and the two-dimensional NMR techniques employed for examining polymer microstructure, chain conformation, and the structure of associating polymers. NMR spectroscopy has been extensively utilised for the characterisation of polymers in solution, essentially to understand structure–property relationships at the molecular level and to ascertain how changes in the synthetic methodology affect the structure of materials.

The penultimate chapter provides insight into the field of solid-state NMR of polymers, covering the NMR determination of chain conformation in semicrystalline and amorphous polymers, polymer blends, and multiphase polymer systems, as well as the NMR methods used to study chain organisation on longer length scales. The final chapter outlines the dynamics of macromolecules, providing detailed information on the NMR methods used to study polymer dynamics both in solution and in the solid state. The study of the molecular dynamics of polymers is of great importance, as many synthetic polymers are useful because of their physical and mechanical properties in the solid state, properties which are ultimately related to molecular-level dynamics. Studies in solution primarily reveal information about intramolecular forces, while the molecular dynamics in the solid state are determined by the combination of intra- and inter- molecular forces.

In conclusion, this is an extremely informative volume that provides a wealth of background information into the history, development and modern application of NMR techniques to the everyday problems associated with polymer characterisation. It is therefore highly recommended to academic and industrial researchers with interests in such areas of polymer science.

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***Nuclear Magnetic Resonance*, Vol. 25, G.A. Webb (Senior Reporter), The Royal Society of Chemistry, Cambridge, 1996, pp xxi + 541, Price £179-50, ISBN 0-85404-307-1**

This volume is part of the ‘Specialist Periodical Reports’ series on NMR which continues to provide comprehensive coverage of the NMR literature, essentially on an annual basis and represents a review of the literature published

between June 1994 and May 1995. The introductory chapter to this volume provides a list of all books and reviews, with NMR as the principal theme, that were known to the compiler for the period under review. The compilation is sectionalised for the reader's convenience into books, regular review series, edited books and symposia, reviews in periodicals, reviews and books in foreign language, and details over 650 articles. The foreign language articles are subdivided according to language and the English title is provided.

The following two chapters provide detailed information on the theoretical and physical aspects and applications of nuclear shielding. The shieldings of particular nuclear species are comprehensively covered in the latter of these chapters. The theoretical aspects and applications of spin-spin couplings are dealt with in the next two sections. Subsequent chapters discuss solid-state NMR and multiple pulse NMR. Ninety percent of the papers on solid-state NMR cited in *Chemical Abstracts* during this review period are concerned with the application of the technique, with the remaining ten percent involving technique or analysis development. The areas that have received greatest attention are polymers, biological materials, zeolites and zeotypes and minerals.

The remaining six chapters detail specific areas of application and include natural macromolecules, synthetic macromolecules, conformational analysis, NMR spectroscopy in living systems, NMR imaging and oriented molecules. There are several sub-sections of specific interest to the bio-organic chemist, including peptides and proteins, nucleic acids, carbohydrates, and lipids. The only area missing from this volume, compared with previous editions, is a section on 'Nuclear Spin Relaxation in Liquids and Gases', however readers are assured that two years coverage of this area will be provided in Volume 26 of this series.

Volumes in this series are extremely well referenced and incorporate a tremendous amount of information on NMR allowing those with specific interests in aspects of NMR to keep abreast of the pertinent literature without spending copious hours searching for references. Such volumes are particularly valuable to individuals who want to get rapidly acquainted with a specific sub-field of NMR spectroscopy, and are therefore highly recommended.

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***Enzymes for Carbohydrate Engineering*, K.-H. Park, J.F. Robyt, Y.-D. Choi (Eds.), Elsevier Science BV., Amsterdam, The Netherlands, 1996, pp. Vii + 215 Price \$147.00, ISBN 0-444-82408**

Currently, the industrial or bulk enzymes play an important role in many biotechnological processes. Polysaccharide-degrading enzymes represent one of the most significant groups of industrially important bulk enzymes. Such enzymes include amylases, pectinases and cellulases. In addition, several other carbohydrate transforming enzymes such as glucose isomerase, invertase and lactase also significantly involve in commercial markets. Carbohydrate engineering is also currently an important part of biotechnology. As the application of enzymology to carbohydrate engineering has developed rapidly, the gap between researches and applications in bio-industries has become greater.

This book, *Enzymes for carbohydrate engineering: Progress in Biotechnology, Vol. 12*, results from two consecutive symposia which were organised by the Research Centre for New-Bio-Materials in Agriculture held in Suwon, Korea. The book gives most up-to date information and achievements in enzymology as applied to carbohydrate engineering. The opening chapter presents a comprehensive survey of the synthetic mechanisms and actions of glucan-sucrases. Several chapters deal with characterisation and modification of amylases and related enzymes. This book also provides a comprehensive survey of the structures of the cellulases, pectinases and xylanases involved in the breakdown of plant cell walls. In addition, it gives an information for the manipulation of storage compounds, including lipids, in transgenic plants. In recent year, the use of thermophilic organisms as sources of more stable enzymes has generated considerable interest. One chapter in this book deals with the properties of thermozymes: amylopululanase and xylose isomerase.

Many valuable ideas and information from many fields of research work such as basic chemistry, molecular biology, and enzymology, carbohydrate enzymology, biotechnology, agricultural engineering presented in this book can be important sources for biotechnological developments. Therefore, this book is an informative reference for enzyme technologists and those in carbohydrate technology

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