

by describing the fundamental organic chemistry of monosaccharides (Chapters 3, 4 and 5). Recent progress in the use of monosaccharides as starting materials in the synthesis of biologically-important oligosaccharides and enantiomerically-pure non-carbohydrate products is covered in Chapters 6 and 7.

Finally, Chapter 8 deals with sugars found or related to natural products, the subject matter here focusing on compounds of biological importance and medicinal significance, thus serving as an introduction to glycobiology for non-biologists whilst providing biologists with chemical features of the compounds.

The text includes five appendices, adding a reference source angle to the book, including information on nomenclature, NMR, chemical shift data, polarimetry and systematic names of microbiological sugars.

The book is written in an easily comprehensible style with good clear diagrams preventing a monotony of text. The authors are amongst the most senior authoritative scientists in the carbohydrate area, having published valuable works over a number of years; they have achieved similar status with this volume which is a further tribute to their reputation and ability to move with the times. This edition comes very highly recommended, equally of interest to chemists, biochemists, and biologists.

John F. Kennedy
Andrew D. Suett

A Functional Analysis of Lignins and Their Derivatives.
By G.F. Zakis. Tappi, Atlanta, USA, 1994. 94 pp. Price £79.00 ISBN 0-89852-258-7 (available in Europe exclusively from American Technical Publisher Ltd, Herts, UK).

If you work in the area of plant biology, wood, chemistry or paper science, lignin is an inevitable polymer for study. However, this is not easy owing to the complexity of its macromolecular structure.

Apart from the biological importance of lignin, it does not presently play a vital role in industry possibly due to its complexity. Although many existing volumes discuss novel applications, structure and the chemical and biological degradation of lignin, few, however, focus on each of the multifunctional groups of lignins (e.g. methoxy, hydroxyl and carbonyl groups) in any detail, though the knowledge of each functional group is essential in understanding lignins.

A Functional Analysis of Lignins and Their Derivatives provides detailed chemical methods for the analysis of lignins and their derivatives and is composed of five chapters. The physical and chemical properties of lignins and their importance in sample preparation are described in Chapter 1. Methoxy groups are determined by the methods of Zeisel-Viebböck-Schwappach, Kirpal and Bühn, or by methanol elimination (Chapter 2), Chapter 3 focuses on methods for the determination of various types of hydroxyl groups (including acidic hydroxyl groups, phenol hydroxyl groups, guaiacyl phenol groups, catechol, *p*-hydroxy and *p*-alkoxybenzyl alcohols, and carboxyl groups). Carbonyl group determination (by oximation, gasometric borohydride, and spectrophotometric methods) are discussed in Chapter 4, which also includes methods for the determination of quinone carbonyl groups and the preparation of reduced lignin. Analysis of acidic groups of lignosulphonic acids and nitrogen-containing lignin derivatives are discussed in Chapters 5 and 6, respectively.

This book practically describes analytically important methodologies, by referring to their principles, experimental apparatus set-up, calculation methods, and provides examples of results, which will aid all students and researchers involved the study of lignin materials.

John F. Kennedy
Jiro Shimizu