

Book Reviews

Practical High Performance Liquid Chromatography, 3rd ed.

Veronika R. Meyer; Wiley, New York, 1998, xiii + 338 pages, hardback, ISBN 0-471-98372-1, £90.00, paperback, ISBN 0-471-98373-X, £50.00

High-performance liquid chromatography (HPLC), is one of the most important separation methods and analytical techniques available. HPLC is very efficient, yielding excellent separations rapidly, it is a powerful separation method able to resolve mixtures with large numbers of similar analytes.

Practical High Performance Liquid Chromatography, 3rd ed., provides a unified approach to HPLC, with both the theoretical and practical aspects of the subject treated equally. The text deals with separations where the particle diameter of the stationary phase does not exceed 10 μm , and where the column is well packed giving a plate weight of less than five. The major HPLC methods: reverse-phase; ion exchange; ion-pair; adsorption; size-exclusion; and affinity are well described with practical method development procedures and a variety of applications. More advanced analysis is also considered: chiral chromatography; supercritical mobile phase; micro and capillary and electrochromatography.

This well illustrated and easily readable volume shows many possibilities and problems associated with HPLC. The chapters have been revised considerably, and one chapter covering the pump has been completely rewritten, covering the general requirements, details of the short-stroke piston pump, maintenance, repair and other pump designs. A synopsis of the most important formulas is included, along with chapters on solvent properties, instrument tests and troubleshooting.

This book is a classic HPLC text, appropriate for undergraduate and postgraduate students using HPLC and those professionals undertaking HPLC analysis. It features updated references and figures on instrumentation, as well as numerous other improvements.

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The Elements of Polymer Science and Engineering, 2nd ed.

A. Rudin; Academic Press, San Diego, 1999, xvii + 509 pages, ISBN 0-12-601685-2, US\$65.00

Synthetic polymer research and technology is an extremely active scientific field due to the commercial importance of such materials. *The Elements of Polymer Science and Engineering, 2nd ed.* is intended as an introductory text, and is also useful as a self-instruction guide for engineers and scientists without formal training in the subject who find themselves working with synthetic polymers. The material presented in this volume, therefore, begins with basic concepts, the opening chapter covering introductory concepts and definitions, e.g. degree of polymerisation, copolymers, molecular architecture, thermoplastics, elastomers, nomenclature, etc.

The mechanical properties and processing behaviour of polymers depends upon their average size and distribution of sizes of macromolecules. Chapter 2 of this volume, therefore, deals with the basic principles of polymer molecular weights, whilst chapter 3 covers practical aspects of molecular weight measurements, focusing upon the fundamentals of molecular weight statistics and the measurement of molecular weight averages. Light scattering, dilute solution viscometry, and size exclusion chromatography, are discussed in specific sub-sections. The fourth chapter outlines the effects of polymer isomerism and conformational changes, covering constitutional isomerism, configurational isomerism, polymer conformation, amorphous molecular dimensions, and rubber elasticity.

The following five chapters deal with different types of polymerisation, namely step-growth polymerisations, free-radical polymerisation, copolymerisation, dispersion and emulsion polymerisation, and ionic and co-ordinated polymerisations, respectively. Chapter 10 introduces polymerisation reaction engineering, and aims to demonstrate how basic concepts are applied in practice. The penultimate chapter discusses the basic elements of the mechanical properties of polymeric solids and liquids (melts). Topics such as viscoelasticity, dynamic mechanical behaviour, fracture mechanics and rheology are discussed because of their importance to polymer applications. Polymer mixtures are of great commercial importance and are covered in the final chapter. Compatibility, solvents, plasticisers, reinforced elastomers, and reinforced plastics are discussed.

Obviously, it is impossible for a volume of this size to be

totally comprehensive with respect to its topic coverage. However, this is an informative volume that provides readers with a readily accessible overview of polymer science and technology and is, therefore, recommended to all individuals with interests in this area.

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Starch: Basic Science to Biotechnology. Advances in Food and Nutrition Research, Vol. 41

M.N. Sivak, J. Preiss (Eds.) Academic Press, San Diego, 1998, xiv + 199 pages, ISBN 0-12-016441-8, £59.95

The majority of starch is utilised as food, however approximately one third of produced starch is employed in a variety of industrial processes that take advantage of its unique properties. Research into the biosynthesis of starch, whilst aiming to answer fundamental questions, can also be used to increase the starch content in plants and/or to manipulate its quality (e.g. altering the amylose:amylopectin ratio). Starch content has been increased in tomatoes and potatoes using recombinant DNA and molecular biology techniques.

The overall aim of *Starch: Basic Science to Biotechnology* is to provide an up-to-date account of the biochemistry and molecular biology of starch by discussing the chemistry of the starch granule and the biochemistry, molecular biology, plant physiology, and genetics of plant starch synthesis. The volume commences with an introductory chapter on the occurrence of starch, discussing starch in seeds, storage roots, tubers, stems, leaves, and algae. The second chapter details the structure of the starch granule, covering the nature of amylose and amylopectin, a comparison of the composition of different commercial starches, and molecular orientation in the granule.

The biosynthetic reactions of starch synthesis are discussed in chapter 3. The metabolic routes leading to polyglucan synthesis were elucidated in the 1950s after the discovery of nucleoside-diphosphate sugars. Topics covered include the ADPglucose pathway, the rate of starch synthesis, and the activity of starch biosynthetic enzymes. ADPglucose is formed via a reaction catalysed by ADPglucose pyrophosphorylase (ADPGlc Ppase). Synthesis of ADPGlc Ppase, its regulatory properties, subunit structure,

structure–function relationships, substrate-binding sites, and cloning of ADPGlc Ppase genes, is presented in the fourth chapter. After the synthesis of ADPGlc the next stage involves the transfer of the glucosyl moiety of the sugar nucleotide to a maltosaccharide or starch, by a starch synthase. Starch synthases are covered in chapter 5, whilst the following chapter discusses branching enzymes.

The next four chapters discuss questions and hypotheses in starch biosynthesis, starch synthesis in non-photosynthetic plant tissues, regulation of the starch synthesis pathway, and starch accumulation in photosynthetic cells, respectively. The penultimate chapter details starch degradation and discusses amylases, debranching enzymes, degradation pathways, starch digestion in humans, and mechanisms of action. The industrial applications of starch and its chemical and physical processing are summarily discussed in the final chapter. Topics covered include starch production, physical analysis of starch and starch derivatives, chemical modification, sweetener production, and biodegradable polymers. For many of the important discoveries the authors' names and dates are included so that the reader is introduced to leading researchers in the field. In conclusion, this is an extremely informative volume that is of benefit to individuals with research interests in starch science.

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Named Organic Reactions

T. Laue, A. Plagens; Wiley, Chichester, 1999, x + 288 pages, ISBN 0-471-97142-1, £34.00

Named reactions serve several useful purposes with respect to organic chemistry. They allow individuals to discuss reactions with greater ease, both verbally and in written communications. Furthermore, they are an extremely useful aid for teaching/learning the principles of organic chemistry, since the scientific content behind the name is of great importance. Therefore, knowledge of such reactions is essential for the organic chemist. This volume does not attempt to be a replacement for a general organic chemistry textbook, but aims to be a comprehensive reference work on named reactions, which is suitable for general reference/reading, learning and revision purposes.

Named Organic Reactions deals with 134 of the most