

more detailed discussions, including heterogeneous systems, water mobility, molecular motions, and enzyme activity, which are covered in later chapters. An informative chapter focuses on the glass transition in sugar–water systems. Water acts as a universal plasticizer for the carbohydrate structure and therefore strongly influences the temperature at which the glass transition occurs, which can be of paramount importance in food applications.

The next six chapters cover the analysis and authentication of foodstuffs including the application of high resolution NMR and SNIF-NMR. Such techniques have proved to be invaluable in the detection and monitoring of food adulteration. Specific application examples discussed in this section include the analysis of lactic acid bacteria to aid in the understanding of wine fermentation and the monitoring of trace amino acid profiles as a fingerprint in European wine analysis. The application of magnetic resonance techniques to the study of nutrition is presented in a subsequent section. Such methodologies can be utilised to aid our understanding of human metabolism and disease.

Food systems pose interesting and important problems with respect to rapid, non-invasive analytical techniques, and the final section involves the study of biopolymers in such complex systems. Specific topics include water–macromolecular interactions in chocolate and the analysis of cereal proteins. A chapter in this section discusses conformational and dynamic analysis of polysaccharide gels. The gel-forming ability of a number of polysaccharides, e.g. curdlan, starch, pectin and carrageenan, is a crucial physico-chemical attribute in many food applications, such as in the manufacture of marmalade.

This volume presents a detailed up-to-date account of research in this constantly advancing area of food science through contributions by experts who demonstrate the importance of magnetic resonance in food science and nutrition, and the application of such techniques to industrial processes. It is therefore highly recommended to individuals with interests in the food science sector, as well as those interested in applications of spectroscopic techniques.

**Charles J. Knill**  
**John F. Kennedy**

**Liquid Chromatography of Oligomers.** C.V. Uglea (ed.), Marcel Dekker, New York, USA, 1996, 344 pp., price \$150.00, ISBN 0-8247-9720-5

Anyone working in the area of separation science is very familiar with the use of chromatography for identifying the qualitative and quantitative composition of complex mixtures. Those working with small molecules, pharmaceuticals, additives, plasticisers, food components etc. will know the value of high performance liquid chromatography for sample analysis while polymer chemists will

know the value of gel permeation chromatography in characterising polymers for molecular weight and distribution parameters. The application of liquid chromatography to the analysis and characterisation of oligomers is less familiar although the technique would be eminently suitable. The book attempts to address the specific use of the technique for this application.

There are four chapters in this book, the first two are relatively short and deal with the definition, history and nomenclature and also molecular nonhomogeneity of synthetic oligomers. This includes specific characteristics of oligomers which must be considered when attempting to develop a separation or interpret data. The third and fourth chapters deal with liquid chromatography and gel permeation chromatography respectively. In the chapter dealing with liquid chromatography, there is extensive treatment of the theory of the technique and also information on types of column packings, the chemistry of their production and suppliers. The parts of the chromatograph are discussed, methods of detection and detectors as well as lists of equipment suppliers are included. Much of the information relates to all types of liquid chromatography separations and isn't specifically relevant to the analysis of oligomers. Applications of the technique for oligomer characterization are tabulated with a literature reference. The gel permeation chromatography chapter follows the same format, theory, types of packing materials, non-size exclusion effects, and practical considerations. Again applications are tabulated with a literature reference. Indeed, the book lists approximately 1500 references, some of which are essential if information on actual separations are required as none is given in the text.

Although the author has identified an area of liquid chromatography which is under utilised the lack of information on actual separations which can be achieved limits its usefulness. Indeed there is not a single chromatogram of a "real" oligomer separation in the book. For any scientist with experience in liquid chromatography, this book is of limited use being merely a source of references but for people working with oligomers and who have no experience of the technique and wish to understand the theory it may be of some interest.

**John F. Kennedy**  
**Linda L. Lloyd**

**Food: The Chemistry of its Components (third edition).** T.P. Coultate (ed.), Royal Society of Chemistry, Cambridge, 1996, xii + 360 pp., price £14.50, ISBN 0 85404 513 9

Public awareness of the chemistry of food and food processing has increased dramatically in recent years as

a result of press and media coverage of the importance of a healthy diet and the possibility of harmful effects of additives used in the food industry.

This book not only informs the reader about the molecular structure of the components of food, but also attempts to explain the chemical changes that take place during food handling and processing. The major dietary components, such as carbohydrates (mono-, oligo- and polysaccharides), lipids and proteins are described in some detail in Chapters 1–5, followed by colours, flavours, vitamins, minerals and water in subsequent chapters. The much publicised E-numbers are dealt with in a chapter on preservatives and even less attractive components such as agricultural residues are considered in a chapter on 'undesirables'. Throughout the book, the aim is not only to discuss what food is made of but also to try to explain how it 'behaves'. The author is at pains to point out the interdisciplinary nature of the material, making excursions into topics from physics to biology as required. Chemical structures are presented simply and systematically using neat, clear diagrams. The book is pitched at a standard that is easily accessible to science undergraduates and, although it is obviously designed to form the basis of an undergraduate course in food chemistry, at £14.50 it would be an interesting addition to the bookshelf of anyone with a scientific background and a desire to learn about the structure of food components and the chemistry of cooking.

Emma J. Place  
John F. Kennedy

**Nuclear Magnetic Resonance: Concepts and Methods.** D. Canet (ed.), John Wiley and Sons, Chichester, UK, 1996, x + 260 pp., price £55.00, ISBN 0-471-94234-0

Nuclear magnetic resonance spectroscopy (NMR) is one of the most powerful analytical techniques known to scientists. Like other forms of spectroscopy, for instance, infrared and ultraviolet, NMR deals with the measurement of energy gaps between states of different energy. However, unlike most other forms of spectroscopy, the phenomenon requires the presence of an external magnetic field and concerns nuclei rather than electrons. At present, NMR is the most powerful technique for structural analysis because it defines the environment of all occurring functional groups, as well as of fragments such as hydrogen atoms attached to carbon. In addition, it is a non-destructive method. Therefore, the analysed samples can be reused. NMR may also be utilised for quantitative determination even though its sensitivity, compared with optical techniques, gas chromatography, and mass spectrometry, is lower.

This book is the English translation of the original book which was written in French in 1990–1991. The

opening chapter presents an overview of the important concepts of NMR. It includes the basic approach to the interpretation of common NMR spectra in the liquid state and in the anisotropic medium. It also involves the advanced mathematics and quantum mechanics (Fourier transformation, product-operator formalism, signal processing techniques, etc.). It explains some concepts of spin relaxation which deal with spin dynamics in relation to molecular motions including rotational and translational motions in a more general way. The final chapter is a survey of the major multipulse and multidimensional methods of present day NMR including selective excitation, correlation spectroscopies and NMR imaging.

This is a very educational and comprehensive book providing many aspects of NMR and a detailed insight into the new area of the analytical techniques. Therefore, it is suitable for advanced undergraduate level in most fields of science, including chemistry, physics, biology, biomedicine, surface science and environmental analysis.

Pawadee Methacanon  
John F. Kennedy

**Carbohydrate Chemistry for Food Scientists.** Roy L. Whistler and James N. BeMiller (eds.), Eagan Press, St. Paul, MN, USA, 1997, 241 pp, price \$114.00, ISBN 0-913250-92-9

Food scientists and engineers deal more with carbohydrates than with other food ingredients because of their abundance, low price, food value, and excellent ability to control the physical properties of foods. They are amenable to both chemical and biochemical modification and both modifications are employed industrially to improve their properties and extend their use.

"*Carbohydrate Chemistry for Food Scientists*" deals with the chemistry and functionality of carbohydrates in natural foods, food product formulations, and food processing, storage and preparation. Chemical and physiochemical properties of natural and modified carbohydrates of all sizes are extensively treated. Explanations of how industry professionals apply this knowledge to the properties and use of carbohydrate ingredients are also included.

Information is also provided on the biochemistry and metabolism of carbohydrates to give an understanding of caries formation, of carbohydrate digestion and of other changes in carbohydrates as they pass through the human gastrointestinal tract. The physiological and nutrition aspects of carbohydrates are also treated.

"*Carbohydrate Chemistry for Food Scientists*", an introduction to the basis of carbohydrate chemistry in food science, is an easy-to-read guide for advanced students or for food scientists and engineers. Complex