New Physico-chemical Techniques for the Characterization of Complex Food Systems. Edited by E. Dickinson. Blackie, Glasgow, UK, 1995. xii + 356 pp. Price £75. ISBN 0-7514-0252-4.

The two major classes of food materials are proteins and polysaccharides, and either can occur as essentially pure macromolecules or as part of highly specific structures, the properties of which are not macromolecular but supramolecular in form. Major advances have occured in the understanding of food biopolymer behaviour mainly by the application of many chemical and physical techniques. The importance of these techniques is clearly on many levels. There is academic interest in understanding the structure/function relationships in food components, but there is also great practical importance. The food industry has as major tasks the maintenance of consistent quality and the control of the behaviour and performance of food materials.

New Physico-Chemical Techniques for the Characterization of Complex Food Systems is based on a collection of lectures delivered at a symposium under the same name held at the University of Leeds, UK. It describes a range of new techniques in the fields of microscopy, spectroscopy, scattering and rheology, which can be used to probe food structure at the molecular, colloidal and microscopic levels.

Among the many topics covered are the advances in electron microscopy, imaging food systems by confocal laser scanning microscopy, scanning probe microscopy of food related systems, electron spin resonance spectroscopy for detection of irradiated food, fracture mechanics of solid foods ultracentrifugation, and rheology studies of food biopolymers. Also covered are recent developments in infrared spectroscopy and microscopy, ultrasound studies of crystallization, dynamic surface tension, light scattering studies, high resolution nuclear magnetic resonance spectroscopy of food components, and magnetic resonance imaging in food science.

Each chapter introduces the essential background principles of the technique, discusses its main advantages and disadvantages, and illustrates its application with a number of food related examples.

This book is an important reference tool for students, food technologists in industry and experienced researchers.

Marion Paterson
John F. Kennedy

Production of Hydroxypropyl Starch in a Continuous Static Mixer Reactor. By Gerard Lambers. PhD Thesis, University of Groningen, The Netherlands, 1995. 185 pp. Price Dfl 60.00. ISBN 90-9008699-4.

The physical properties of native unmodified starches have made starch an important substance in food and industrial applications for centuries, but very often native starch is not the best product for a particular application. Modification of starch properties by chemical derivation is therefore an important factor in the large scale use of starch.

A most significant group of modified starches is the hydroxyalkyl starch esters, such as hydroxyethyl and hydroxypropyl starch. Manufacturing techniques for the production of hydroxyalkyl starch esters have been around since the 1930s. From the 1950s these processes were applied to the manufacture of hydroxyalkyl starch esters by reacting alkaline starch with alkylene oxide (ethylene or propylene oxide).

This thesis focuses on the production of hydroxypropyl starch in a continuous static mixer reactor. It consists of ten chapters and is roughly divided into two halves. It begins with an overview of different modified starch types and production methods and gives an outline to the thesis. The design of a suitable continuous static mixer reactor for this process requires the selection of a commercially available static mixer together with knowledge of the kinetics of the reactions that are involved in the production of hydroxypropyl starch and the viscosity of concentrated starch pastes. All such considerations are explored in Chapters 2–5.

The second half of the thesis is concerned with the actual running of the static mixer reactor and commercial scale production of hydroxypropyl starch. This requires not only knowledge of the rheological behaviour of starch pastes within the static mixer reactor but also resistance time distributions as well as heat transfer within the static mixer reactor, together with actual plant scale production and operation, all of which are covered in Chapters 6–10.

This is an extremely informative thesis which is also well referenced. It should prove useful to anyone working within the starch industry or those in academia with an interest in starch chemistry.

Tracey A. Norris
John F. Kennedy

Sugar Confectionery Manufacture: Second Edition. Edited by E.B. Jackson. Blackie, Glasgow, UK, 1995. xxiii + 400 pp. Price £79. ISBN 0-75140-198-7.

Sugars are undoubtedly the most important components of virtually all confectionery products. The successful manufacture of sugar confectionery products is dependent on a limited but key group of physical and chemical changes which influence recipe composition and methods of production. This fully revised and updated volume provides a highly practical and comprehensive review of the sugar confectionery manu-

facturing industry. It is essentially divided into sections covering the production and properties of raw materials, manufacturing processes, and other technological aspects of the subject, with many of the original chapters having been totally rewritten and re-organised, compared with the first edition, to reflect today's markets.

The opening introductory chapter deals with sugar (sucrose) itself, outlining the production of cane and beet sugars and discussing the different marketed grades of sugar. Some of the properties of sugar and sugar solutions are also discussed. The next four chapters deal with the production of a variety of major confectionery ingredients/additives such as glucose syrups, starch hydrolysates, gums, gelling agents, oils, fats, colours and flavours.

The technical aspects of industrial confectionery manufacture are dealt with in the next five chapters, which are geared towards specific products, such as boiled sweets, caramel, toffee, fudge, jellies, liquorice, marshmallow, nougat and chewing gum. The equipment required for the production of such confections is presented in diagrammatic detail.

Other topics discussed include the very different methods employed for the preparation of tablets and lozenges (forms that are frequently confused), quality control and chemical analysis, packaging and shelf-life evaluation, and countlines and cereal bars. The term 'countlines' describes a category of confectionery products which are sold as individually wrapped units intended primarily for single-person consumption. In traditional confectioners, tobacconists and newsagents they are displayed and sold from the counter unit adjacent to the till.

Very little information has been published on the structure of confectionery. Two chapters, therefore, attempt to relate available experimental data to the known behaviour of various confectionery products during preparation and storage. Confectionery products must be both structurally and microbiologically stable at ambient temperature.

This volume has been primarily written for food scientists and technologists in the sugar confectionery manufacturing industry, but also aims to serve as a useful reference source for ingredient suppliers and equipment manufacturers and those working in academic and research institutions. It is well presented, with a good index, and is highly recommended.

John F. Kennedy
Charles J. Knill

Bioseparation Processes in Foods. Edited by R.K. Singh & S.S.H. Rizvi. Marcel Dekker, New York, USA, 1995. viii + 469 pp. Price $175. ISBN 0-8247-9608-X.

In biotechnological developments in food manufacture, the separation or purification of biomaterials from their original sources or mixtures during processes has become very significant. Since biological processing always involves large numbers of low-volume products, bioseparation steps are occasionally difficult to scale-up and apply in commercial aspects. However, when they are developed, they can be fully practical in industrial manufacture. Bioprocessing can also be used in a variety of ways to produce value-added products. The various applications of biomaterials separation embrace protein, enzyme, polysaccharide and flavour materials.

Each year the Institute of Food Technologists (IFT) and the International Union of Food Science and Technology (IUFoST) have hosted a two-day Basic Symposium on Food Science. This book, *Bioseparation Processes in Foods*, results from the eighteenth symposium in that series, which was held in Atlanta. It also presents the basics of bioseparations, extraction with or without supercritical fluids, scale-up techniques, precipitation, foam fractionation, large-scale electrophoresis, affinity chromatography, membrane separations, microfiltration, ion exchange for whey protein isolation, and separation processes used in flavour manufacturing and enzyme recovery. In addition, it shows novel techniques and systems, some of which are already in operation in the food industry or are being tested in pilot plants.

With easily comprehended examples, schemes, tables and photographs, this book is an invaluable reference source and is recommended for food scientists and technologists, and chemical engineers.

Pawadee Methacanon
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