

Book reviews

Food Polysaccharides and Their Applications, 2nd ed., A.M. Stephen, G.O. Phillips, P.A. Williams (Eds.). CRC Press, Boca Raton, FL, USA (2006). x+733 pp., £109-00, ISBN: 0-8247-5922-2

Food polysaccharides are of great importance in our day-to-day life, both as an essential dietary component in all cultures, and as additives to a huge variety of prepared foods. In this ever-changing field of biochemistry, the analysis and evaluation of polysaccharide foodstuffs is of utmost importance, and this second edition has been updated to reflect recent developments and discoveries.

Arranged by topic, the 20 chapters of this book cover a wide range of information pertinent to the subject. Starches, being obviously one of the most extensive and important dietary energy sources, are comprehensively examined in the first four chapters. The understanding of the structure of starch, its possible modifications and its reactions and reaction products, is vital for a full understanding of the role of starch in nutrition. All of these concepts are explained, along with examples of applications of starches in specific products.

Further chapters describe the most commonly found food polysaccharides, with respect to their source, biosynthesis, molecular structure and physical properties. Again this information is given with examples of their applications and production in food formulations. The importance of the interactions of polysaccharides with other biological macromolecules is also covered, with details of the interactions with proteins, lipids, sugars and metal ions all described. Furthermore, effects of heat and cooking on polysaccharides are discussed, and a detailed overview of analytic techniques regarding the quantitative determination and identification of polysaccharides is presented.

The fundamental biochemistry of the book is balanced by the examples of the practical applications given, but also by the chapters of the book that address more ethical considerations of polysaccharide food chemistry. Chapter 9 is devoted to exploring the issues, and delineating the facts, of genetic modification of food crops. This includes an overview of the techniques of genetic modification, as well as a discussion of the commercial and possible humanitarian benefits of genetic modification.

Completely new to the second edition of this book is an explanation of the preparation of novel starch esters, as

well as improved techniques for the production of acid-converted and oxidized starches. New information on the natural functions of cell wall polysaccharides of seeds, in relation to their molecular structure, biosynthesis and enzymatic hydrolysis is also covered. Also for the first time in this edition, information regarding IR and NMR spectroscopic analysis is presented.

This book has an impressively comprehensive scope regarding the subject of the title, and will be of use to both students and professionals in the area of food technology, nutritional science and biochemistry.

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Carbohydrates in Food, 2nd ed., Eliasson, A.-C. (Ed.). CRC Press, Boca Raton, FL, USA (2006). vi + 546 pp., £79.99, ISBN: 0-824-759-427

Food manufacture is one of the largest industries. It continues to expand providing customers with a variety of food and beverages products. On the other hand, growing expectation of quality from customers has led to the application of specific, quantitative and rapid analytical methods to obtain data on the composition of products. The most frequently required analysis is determination of mono-, disaccharides and polysaccharides, which are classified as carbohydrates. Carbohydrates are sugars containing carbon, oxygen and hydrogen atoms.

The second edition of *Carbohydrates in Food* combines the latest data on the analytical, physico-chemical and nutritional properties of carbohydrates. The first three chapters concentrate on mono and disaccharides, which are the lowest molecular weight carbohydrates. They are added to food to increase sweetness and storage stability, to give colour and flavour. Mono and disaccharides may

exist in amorphous (non-crystalline) form with a random molecular order in some food products. Crystallisation of sugar is often an undesired phenomenon during storage. However, controlling crystallisation may involve either preventing crystallisation or promoting crystal formation. Sugars are also an important part of a balanced diet providing significant energy. Thus, it has been suggested that too big an intake of free sugar may cause diseases such as obesity, dental caries or diabetes.

Following chapters discuss structural, chemical and functional aspects of cell-wall polysaccharides and hydro-colloids (food gums). Cell-wall polysaccharides in food are not only structural and energy-yielding compounds but may also regulate the utilization of other dietary components and affect animal and human health. Mainly they control rheology and texture properties of food, water binding and they are an important source of fibre. Hydro-colloids are water-soluble or partially water-soluble polysaccharides obtained from marine or land plants sources with the exception of xanthan, gellan and curdlan, which are produced by microorganisms. Gums are used to determine texture, stability or other quality attributes. For this reason they are classified as texture agents. Because of their polysaccharide nature, gums are difficult to analyse. Most current used methods to determine amount and structure of hydrocolloids depends on extraction of gum, followed by fractionation of the extract. However, great progress has been made in the determination of chemical structures using a variety of methods such as NMR, GLC–MS, and X-ray fibre diffraction analysis. Those methods are discussed in chapter 6.

Carbohydrates in food can be classified as non-digestible (fibre, non-starch polysaccharides and resistant starch) or digestible (mono-, disaccharides and oligosaccharides, and starch). Non-digestible carbohydrate may be consumed because of their therapeutic properties, for example galacto- and fructo-oligosaccharides are known for their probiotic properties. On the other hand, digestible carbo-

hydrates are the most important energy provider in human nutrition. Starch is used in a wide range of food products. It works as a thickener, as a bulking agent, as an absorbent of water, as a source of energy in fermentation. When starch is heated it absorbs water and swells, which is known as the gelatinization process. During gelatinization the crystal structure of the starch granule is being destroyed but during storage crystallinity can emerge again. This may cause several problems while using starch in food production. That is why the food industry has introduced chemical, physical and genetic modification to the starch to improve its functional properties. Analytical, physico-chemical and nutritional aspects of the starch are the major topics that the last three chapters of *Carbohydrates in Food* focus on.

In conclusion, this book evaluates the advantages and disadvantages of using various analytical methods to determine carbohydrates content in food and includes information on relevant nutritional topics in relation to the use of carbohydrates in food. *Carbohydrates in Food* is an important resource for anyone working with carbohydrates in food as it provides essential information on the chemical analysis and physico-chemical properties. Moreover, this edition includes updated information on nutritional aspect of gums, cell-wall polysaccharides and starch.

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