applications, medical textiles (e.g. implants), geotextiles (reinforcement of embankments), agro textiles (textiles for crop protection), protective clothing (e.g. against heat and radiation for fire fighter clothing, against molten metals for welders, stab protection, and bullet proof vests). In all these applications stringent performance requirements must be met.

There are four different types of textiles, the natural textiles which consist of the animal textiles (from fur and hair), plant textiles (from cotton, grass and hemp), and mineral textiles (from asbestos and basalt fibres used in making vinyl tiles, sheeting and adhesives), and the synthetic textiles, which are used primarily in the production of clothing.

Biologically inspired textiles is comprised of 10 Chapters that are divided into two parts. Part one involves the production, properties and biometric principles of textiles and consists of the first five chapters. Part two deals with biometric applications in textiles and includes chapters six to ten.

The introductory chapter covers the characterisation and production of protein-based fibres using recombinant DNA technology (Chapter 1). The purification and separation methods used for these biologically inspired textile proteins are dealt with next (Chapter 2). The spinning techniques used for processing pure silk, collagen and elastin fibrous proteins from both natural and artificial protein-based fibre sources as well as the properties of the products are discussed in Chapter 3. The mechanical properties of silk are studied as well as the relationship between its structure and composition (Chapter 4). The biometric approach in the production of structural composites using plant fibres is discussed (Chapter 5). Biometric principles in the design of clothing, problems facing the clothing industry and the future requirements of the industry are explored (Chapter 6). Other aspects of textile technology, such as those with self-cleaning properties (based on the lotus effect) and methods used to test the hydrophobicity of such textiles are presented (Chapter 7). The thermal properties of animal fur and artificial furs are analysed and compared (Chapter 8). The structural analysis and mechanical properties of some plant stem materials, and the transfer of their physical properties into technical applications is presented (Chapter 9). Finally topical bionic research activities of fibre based materials is discussed (Chapter 10).

In conclusion, this book is aimed at professionals doing research and development and designers in areas of industrial technology especially those dealing with clothing. This volume also gives manufacturers of the future an insight into producing novel textile materials for different applications using environmentally friendly materials and technologies.

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Available online 31 May 2010

doi:10.1016/j.carbpol.2010.04.061

Starch Chemistry and Technology, J. BeMiller, R. Whistler (Eds.), third edition Academic Press, Burlington, MA, USA (2009). (xx + 879 pp, £125.00, ISBN 978-0-12-746275-2)

Starch is a polysaccharide which consists of a large number of glucose units linked together by glycosidic bonds. The general chemical formula of starch is $(C_6H_{10}O_5)_n$. Starch is produced by all green plants as an energy source, and is composed of two types of macro molecules, namely amylose, which is linear and helical, and amylopectin which is branched. The relative quantities of these macro molecules in starch varies significantly depending on the type of plant but is normally in the range of 20–25% amylose and 75–80% amylopectin.

During the process of photosynthesis, plants obtain light energy to produce glucose from CO_2. The glucose is then stored in the form of starch granules.

Starch has a variety of uses but the major use is as a food source since it is the most important carbohydrate in the human diet. In industry, it is used in paper making as a surface coating and sizing agent, for the production of corrugated board adhesives and in the construction industry where it is used in gypsum wall board. Human consumption of starch dates back as far as 115,000 ago, from trace amounts of rice found under excavations and carbon dating gave this age.

This volume is composed of 22 chapters and covers all aspects of starch chemistry and technology. The history and future of starch including the uses of speciality starches and other products of starch is covered in Chapter 1. The expansion of the starch industry in the USA and other countries of the World including the increase in demand and uses of starch in a range of industrial products is the focus of the second chapter. The next chapter deals with the occurrence, genetics and physiology of starch genetics focusing on the non-mutant starch granule; its composition and development. Particular attention is also given to plant species which are important sources of commercial starch such as maize. The biosynthesis of starch and enzyme-catalysed reactions involved in starch synthesis in higher plants and algae is discussed in Chapter 4. Comparison of the enzymes of glycogen synthesis to analogous plant enzymes is also provided. Structural analysis of starch granules, the molecular organisation of the crystalline structure and the use of imaging techniques such as scanning electron microscopy (SEM) and atomic force microscopy (AFM) to analyse the detailed surface structure of granular starch is presented in Chapter 5. This is followed by discussion of the structural features of starch granules with emphasis on their general characteristics and molecular composition, the structures of amylose and amylopectin and molecular components in the granule (Chapter 6). The study of the action of enzymes on starch especially the amylases, the mechanism of enzymatic hydrolysis of glycosidic bonds and the enzymatic characterisation of starch molecules is detailed in the next chapter (Chapter 7), whilst the structure, properties and physical methods of analysis of starch including some aspects of phase transition behaviour are covered in Chapter 8. There is also an extensive study on the different sources of starch, these include: Corn and Sorghum starches, their structure, composition and grain quality, and derived products (Chapter 9); Wheat starch; production, properties, modification and uses (Chapter 10); Potato starch; the history of potato processing, potato starch production and the structure and chemical composition of potato starch (Chapter 11).

Other sources of starch covered include cassava starch (Chapter 12), rice starch (Chapter 13), rye starch (Chapter 14), oat starch (Chapter 15) and barley starch (Chapter 16).

Modifications of starch involving enzyme-catalysed reactions, thermal treatment, physical and chemical modifications to make them more suitable for particular applications by enhancing their properties (Chapter 17).

This volume also covers a variety of uses of starch including the following:

Uses of starch in the paper industry, the application requirements for starch (viscosity, purity, etc.), dispersion of starch and various uses in the industry (Chapter 18). The use of starch as a polymer material, as starch graft copolymer and in rubber starch foams (Chapter 19). Uses of starch in the food industry (Chapter 20), Sweeteners derived from starches, their production, properties and uses (Chapter 21).

The study of cyclodextrins which are produced by specific enzymatic action on starch, their properties, production, toxicity, modifications and applications are presented in the final chapter (Chapter 22).

In conclusion, this volume covers the chemistry of starches, the isolation processes, properties and uses of the most common starches, with particular emphasis on the applications of starch in various industries like the food, pharmaceutical and textile industries. This informative volume is an essential reference work for all researchers with interests in any areas of starch chemistry and technology.

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Available online 31 May 2010

doi:10.1016/j.carbpol.2010.04.060

R. Jayakumar, M. Prabaharan, (Eds.) Current Research and Developments on Chitin and Chitosan in Biomaterials Science, Research Signpost, Kerala, India (2008), (iv + 228 pp, US $108.00, ISBN: 978-81-308-0271-8)

Chitin is a carbohydrate polymer and can be found in shells of beetle and other arthropods, and crabs, shrimps and other crustacea. It is also a major structural component of the cell walls of fungi and yeast. Chitin is known to be one of the most abundant natural amino polysaccharides. Chitin and its derivative, chitosan, partially deacetylated chitin, have recently become of great interest due to their properties which are: non-toxicity, biocompatibility, biodegradability, and they are also hydrating agents. Because of these characteristics chitin and chitosan are of high potential to various fields especially in the pharmaceutical and biomedical sciences.

Current Research and Developments on Chitin and Chitosan in Biomaterials contains nine Chapters and each treats different applications of chitin and chitosan in relation to their properties.

The introductory Chapter covers the preparation, physical and chemical properties of chitin and chitosan. Structural analysis of these polymers and various applications in drug metabolism and gene delivery are also covered. These polymers have properties which make them have useful applications in various industries like the pharmaceutical industry (antibacterial and antifungal activities), in the cosmetics industry (hydrating agents) and also the inhibitory activities of chitosan against fungi and bacteria encountered in foodstuffs, hence its potential use as packaging material in the food industry (Chapter 2). The preparation of chitosan interpenetrating networks are analysed and the current developments and applications of stimuli-responsive materials based on chitosan explained (Chapter 3). There is also research on the biomedical applications of chitosan like its use in wound dressings, stent coatings, and antibacterial coatings. Then various methods of chitosan deposition to substrates such as films and fibres used in tissue engineering are discussed (Chapter 4). Various techniques like X-ray fluorescence, atomic force microscopy and X-ray diffraction spectroscopy are used to study the mechanisms that occur during "in vitro" calcification of chitosan (Chapter 5).

The use of chitosan in human and veterinary medicine especially in mucosal immunisation, as an immunological adjuvant is due to its biocompatibility with most tissues and its biodegradability, (Chapter 6). Current research on chitin and chitosan into the different methods of preparation of chitosan scaffolds for various applications in tissue engineering and future demands on bio-products makes fascinating reading (Chapter 7). Different methods of chitosan microsphere preparations used in the pharmaceutical industry (drug delivery systems for vaccines, anti-cancer drugs, gene and bio-drugs) are explained in Chapter 8. The use of chitosan–calcium phosphate composites in tissue engineering are currently under investigation for use as bone graft substitutes as well as optimising its mechanical strength (Chapter 9).

In conclusion, this book is aimed at professionals doing research and development in various industrial sectors like the medical, pharmaceutical and food industries. This volume clearly shows that there are many possible applications of chitin and chitosan, most of which are currently still under investigation which means that the full potential of these applications is yet to be achieved, making the future for chitin and chitosan research and development a bright and prosperous one indeed.

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Available online 31 May 2010

doi:10.1016/j.carbpol.2010.04.059

Carbohydrates: The Essential Molecules of Life, R.V. Stick, S.J. Williams., 2nd edn., Elsevier Ltd., Amsterdam, The Netherlands (2009). xxi + 474 pp, £54.99, ISBN: 978-0-240-52118-3

Carbohydrates are relatively simple organic compounds that are aldehydes or ketones with many hydroxyl groups. They have a molecular formula of $(CH_2O)_n$, n being equal to or more than three and are the most abundant of the four major classes of biomolecules. Carbohydrates play numerous rules in living organisms such as transport and storage of energy (starch) and as structural components (e.g. cellulose in plants, chitin and chondroitin in animals). Carbohydrates and their derivatives also play major roles in the immune system, fertilization, blood clotting, and development. They are an ideal source of energy for the body because they can be converted more readily into glucose which is the primary form of sugar that is transported and used by the body. Carbohydrates are made up of monosaccharides which are the basic carbohydrate units and are the major source of fuel for metabolism, and in biosynthesis. Examples of monosaccharides are glucose, galactose and fructose. Disaccharides are the simplest oligosaccharides, examples include sucrose and lactose. They are composed of two monosaccharide units bound together by a covalent bond known as a glycosidic linkage formed via a dehydration reaction resulting in the loss of a hydrogen atom from one monosaccharide and a hydroxyl group from the other. Polysaccharides and oligosaccharides are composed of longer chains of monosaccharide units bound together by glycosidic bonds. The distinction between these two is based upon the number of monosaccharide units present in the chain. Oligosaccharides contain between two and nine monosaccharide units, and polysaccharides contain greater than ten monosaccharide units. Polysaccharides represent an important class of biological polymers.

Carbohydrates: *The essential molecules of life* consists of twelve chapters. The introductory chapter deals with the early research