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Carbohydrate Polymers 71 (2008) 147–149
Carbohydrate Polymers
www.elsevier.com/locate/carbpol

Book reviews

Van Langenhove L. (Ed.), Smart textiles for medicine and healthcare. Materials, systems and applications, Woodhead Publishing Limited and CRC Press LLC, Cambridge, 2007 (xiii + 312 pp., £135.00, ISBN 1-84569-027-3)

The world of textiles is very wide and miscellaneous. Their functions as clothes and different materials for everyday use are undeniably an inseparable part of human civilisation. For the last two decades the application of textiles has been directed towards smart materials, which can be used in such areas as sport, medicine, military, aerospace and also fashion. For instance, smart textiles broadly developed in the sport area can play a role as an outdoor-garment with smart membranes, which let in the moisture only in one direction, keep the wearer warm and protect them against the wind. Medical smart textiles are special materials, which can support the monitoring of organ condition, e.g. heart tones. Moreover, smart textiles may be applied as wound dressings, which not only protect the injured space, but also provide the appropriate environment that accelerates the healing process.

'*Smart textiles for medicine and healthcare. Materials, systems and applications*' is a volume where different domains of smart materials for healthcare are explained and discussed. Various trends in smart or intelligent textiles are applied according to the medical use. For instance, electronic textiles or e-textiles present the union of the electronics industry and textiles which is the generation of wearable computing (Chapter 1). Smart wound care materials such as low-adhering dressings, hydrocolloid dressings, hydrogels, polysaccharide fibres or vapour permeable adhesive film dressings are a few examples of intelligent wound dressings (Chapter 2). Administering drugs to the wearer by releasing them into the skin from textiles is an alternative route for dosing remedies when the oral way is not permitted. Cyclodextrins, ion-exchange fibres and drug-containing fibres (microencapsulated) are slow drug-release systems within textiles (Chapter 3). The properties of shape memory materials in medical textiles are explained by physical effects and temperature relationships. Shape memory textiles are being used as e.g. stents, wound closure materials or surgical protective garments (Chapter 4). The use of electronics and different sensors within textiles enables monitoring of the condition of organisms e.g. textile-suit with integrated sensors monitors the heart and respiration rate (Chapters 5 and 6). Some body parameters such as skin-pH and temperature may be changed when exposed to sunlight or water. That may affect the dyes which are included within textiles that can undergo changes when they are reduced or oxidised. This could be visible as a change of colour (Chapter 7).

Other classifications of smart dressings for healthcare can be made in terms of different types of patients. Intelligent garments for pre-hospital emergency care or smart textiles that support rehabilitation are examples that involve fibres and yarns. They must have a proper structure and may be engineered and placed in relation to zones on the body, preferably to suite the demands of individual figure types, postures and sizes (Chapters 8, 9 and 12). Textile systems, which are the wearable platforms able to monitor the vital signs of mother and foetus play a significant role during pregnancy (Chapter 10). Additionally, separate attention might be directed towards smart textiles for monitoring children in hospital (Chapter 11), for examining patients with heart conditions (Chapter 14) and those which are wearable assistants for mobile health monitoring (Chapter 13).

This book is an up-dated summary of information about various smart textiles that might be used to improve the health condition of patients. It contains not only the theoretical background for their mechanisms and structures but also shows practical applications and examples. Therefore it is a collection of rich knowledge about current smart textiles. It is particularly useful for students and lecturers interested in smart textiles for healthcare and medicine.

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Available online 27 April 2007

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doi:10.1016/j.carbpol.2007.04.013

G. Guiochon, A. Felinger, D.G. Shirazi and A.M. Katti, Fundamentals of Preparative and Nonlinear Chromatography, 2nd ed., Academic Press, Amsterdam, The Netherlands, 2006 (xiv + 975 pp., £155.00, ISBN: 0-12-370537-1)

Since the first edition of this book was written, 10 years ago, there has been many advances in the use of chroma-

tography as a preparative technique. The development of practical methods for the determination of absorption energy has permitted identification that the surface of absorbents used in reversed-phase liquid chromatography (RPLC) are heterogeneous, which has consequences on the nature of the equilibrium isotherm. Thus, this second edition of *Fundamentals of Preparative and Nonlinear Chromatography* describes new methods of isotherm determination and how to use them to predict band profiles.

The first part of the book provides the fundamental information required to navigate the world of preparative chromatography, with the first chapter explaining the history of chromatography as a preparative technique, followed by an examination of the theoretical basis of chromatography, explaining the mass balance equation and its general properties and a detailed overview of the equilibrium isotherm and factors that can influence it (Chapter 2). Equilibrium isotherms are discussed in more detail for single components (Chapter 3), and for mixtures and competition for adsorption (Chapter 4). The fifth chapter deals with transfer phenomena in chromatography, such as diffusion, axial dispersion, mass transfer resistance and viscosity of liquids, which completes the first part of the book and the essential knowledge base necessary for the comprehension and discussion of preparative chromatography.

The second part of the book is devoted to the study of diverse chromatographic models. First, the book provides a complete description of the least difficult model to understand, namely linear chromatography (Chapter 6). In this model the influence of thermodynamics on the shape of band profiles disappears and only affects band positions, so it can be studied separately from the kinetics, which controls their profiles. This is important because most qualitative and quantitative analyses are based on this model. The next three Chapters (7–9) cover the non-linear chromatography ideal model for single-component systems, two-component systems, and displacement chromatography, respectively. This ideal model provides a good first approximation about the conduct of the band profiles under strongly non-linear behaviour of the isotherm.

However, when deviations from ideal behaviour occur, it is necessary to use a new model to predict band profiles, namely the equilibrium dispersive model. This model is very important since it permits calculation of the production rate of the required components at the stated degree of purity, and its achieved recovery yield, which are essential to the pharmaceutical and fine chemical industries in which preparative chromatography is used as a purification process. The next four Chapters (10–13) are therefore devoted to single component profiles, two-component profiles, frontal analysis and displacement, and system peaks, respectively. In cases in which the kinetics of the retention mechanisms is slow, other kinds of models are needed, kinetics ones, which are discussed in Chapters 14–16. Finally, in the last two Chapters (17 and 18), different models are applied for investigation of simulated moving bed chromatography properties, and optimisation of preparative chromatography batch processes.

This book is an ideal reference volume for all individuals with an interest in preparative chromatography wanting to understand band generation and separation mechanisms, as well as those actively involved in practical application of such techniques, who wish to improve or optimise their results.

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Available online 10 May 2007

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doi:10.1016/j.carbpol.2007.05.003

S. J. Russell (Ed.), Handbook of Nonwovens, Woodhead Publishing Limited, Cambridge, UK, 2007 (xiii + 530 pp., £180.00, ISBN: 1-85573-603-9)

The term 'nonwoven' was originally applied to dry-laid carded web substitutes for traditional textiles were the yarn spinning stage was omitted, in favour of bonding (consolidation) of the web by various methods (chemical, mechanical, or thermal), thus replacing the weaving/knitting of yarns. However, the nonwoven industry as we know it today has grown from developments in the textile, paper, and polymer processing industries, and also has input from engineering and natural sciences. Nonwoven products have application in many diverse areas, including the medical, automotive, hygiene, and civil engineering industries. The nonwoven industry is therefore an important and rapidly expanding sector that involves intensive research and development and massive investments in new technology to provide materials with specific functionalities depending on the desired performance for a particular application area.

This 'handbook' begins with an overview of the development of the nonwovens industry (Chapter 1), providing information on the definition, classification, and fabrication of nonwovens, along with the market structure and the key companies involved. The following three chapters (Chapters 2–4) are specifically concerned with the main methods of nonwoven production, namely dry-laid, wet-laid, and polymer-laid, web formulation. Dry-laid web formation (Chapter 2) has its origins in the textile industry, and involves techniques such as carding/garnetting, cross-lapping, batt drafting, vertical lapping, airlayering, and bonding. Wet-laid web formation (Chapter 3) has its origins in the paper industry, and this chapter begins by reviewing the background and historical developments,