

which increases the work and hence the friction. Master curves obtained by WLF transform show this effect very clearly: the authors appear to have made little use of the transform in their own extensive work and have not investigated PVC in depth, in spite of the importance of friction/wear in conveyor belting. Chapters 4 and 5 deal with the thermoplastics and elastomers; Chapter 6 with composite friction-producing materials required for brake-blocks. Chapter 7 turns away from materials to erosion caused by gas- and water-borne particulate matter and, lastly, rain erosion. The two major chapters on polymers conclude with sections on applications. For thermoplastics these include bearings in machine and precision engineering, bridge bearings and surgical prostheses. The latter application is handled in depth, including an analysis of the stress cycle in walking and its effect on hip and knee joints. Elastomer applications comprise tyres (of course), sealing strips in buildings and windscreen wipers.

There are numerous tables of properties, detailed reporting of experimental results and many photomicrographs of worn surfaces. It is indeed a lavishly produced book. Authors and publishers are to be congratulated on an important task well done. An English translation would be welcomed.

W. C. Wake

#### **Advances in the microbiology and biochemistry of cheese and fermented milk**

Edited by F. L. Davies and B. A. Law, Elsevier Applied Science Publishers, London, 1984. pp. v+255, price £28.00. ISBN 0-85334-287-3

This edited volume specifically sets out to explain the biochemical processes by which microorganisms and enzymes convert milk into fermented products.

In the first chapter Green reviews the impact of using different types of milk and processing conditions on cheese making and the characters of finished products. While discussing the mechanisms of milk coagulation and its effect on the texture of the product cheese, the author has rightly pointed out the problems which limit our knowledge in the complete understanding of the coagulation process of milk.

The next three chapters by Garvie, Marshall and co-authors, and Gasson and Davies describe the taxonomy, physiology and genetics, respectively, of dairy lactic acid bacteria, all of which are important in the fermentation of cheese and other dairy products. In Chapters 2 and 3 the significance of taxonomic and physiological studies in the development of processes for fermented products and the latest methodological approaches are elaborated. Chapter 4 discusses the various relevant genetic engineering techniques for improving strains of lactic acid bacteria, and, subsequently, enhancing the efficiency of various dairy fermentation processes.

Davies and Gasson (Chapter 5) consider bacteriophages of dairy lactic acid bacteria and recent techniques in the area of molecular biology as an adjunct to understanding the interaction between dairy organisms and their phages. The chapter also suggests practical approaches for phage control.

Chapters 6, 7 and 8 cover various aspects of flavour development and non-sensory methods for flavour evaluation in fermented milk and cheese. The substrates which serve as sources of flavour are metabolic pathways for the synthesis of metabolites, attributable to flavour production in fermented milks (categorised into four types), and the different cheese

varieties: these are discussed comprehensively. The causes of off-flavour development and their impact on the quality of the products also receive attention in the final chapter. Manning, Ridout and Price emphasise the need of using non-sensory methods for assessing the flavour of the cheese and discuss the headspace techniques which employ latest developments in gas chromatography.

The significance of statistical techniques in establishing the relationship between non-sensory and sensory methods, and their role in the future developments in this area, are discussed. The role of process conditions like maturation temperature and use of exogenous enzymes in accelerating the cheese ripening are presented in detail by Law.

In general, the presentation is good, with only a few typographical mistakes. Every chapter includes the latest references, indicating that each topic has been reviewed extensively. This book provides interesting reading for dairy bacteriologists, biochemists and food technologists working on microbiological and biochemical aspects of fermented milks and cheese production. The volume also underlines for the first time the importance of genetic engineering and its role in strain improvement of dairy lactic acid bacteria, which will be helpful in improving the efficiency and economics of the industry.

S. S. Marwaha  
J. F. Kennedy

#### **Adhesives in engineering design**

By W. A. Lees, The Design Council, London, 1984. pp. 152, price £16.95. ISBN 0-85072-150-4

The purpose is stated in the author's introduction: 'The immediate object of this book is to provide the designer or production engineer with information which will allow him to make a rational decision regarding the possible use of adhesives'.

It consists of seven major sections. Section 2 – 'Design' – is by far the most important part and accounts for more than one-third of the volume. It deals in some detail with stress distribution in adhesively bonded components, and covers many practical problems of overlap joints and co-axial assemblies. The advantages of the many possible variants of each type of joint (lap, scarf, butt) are discussed and well presented to the prospective user. The section on practical structures with visual illustrations of *Do!* and *Don't* are particularly useful.

The two other major sections of the book deal with the special role of anaerobic adhesives in mechanical engineering applications and the all-important topic of surface preparation. Tables giving details of recommended procedures for the preparation of surfaces of materials prior to adhesive bonding are useful and comprehensive, covering metals, plastics and composites.

The chapter on adhesive selection covers very briefly various types of adhesives available in the marketplace, and gives the user the pros and cons of the 'family groups' based on chemical classification. This will be of only limited value to the designer and engineer.

Appendix I, contributed by K. W. Allen of City University, covers in 10 pages the 'Fundamental aspects of adhesion' – a short but useful summary of the science of adhesion for the uninitiated reader. The book is likely to be of only marginal interest to polymer technologists.

V. Vohralik