

non-isothermal viscoelasticity: not an easy subject to explain. But it must be said that most of the points have been made before in journal papers, in a manner more accessible to most readers even if less thorough. The book nevertheless provides a useful service in demonstrating how to extend the analysis from the usual case of a flat plate to various axisymmetric geometries (e.g. cylinders, tubes).

The final part is called 'Molecular orientations due to processing' and deals with the effects of preferred orientation, as manifest in anisotropy in a variety of physical properties (birefringence, thermal expansion, thermal conductivity and stiffness). For the reviewer, the interest lay primarily in the rather successful attempt to show correlations between the development of anisotropy in several properties, with increasing degrees of molecular orientation. If these apply generally, they are likely to be highly useful predictive tools. Just *why* the correlations work, however, is explained less convincingly, as controversial physical assumptions are invoked with little justification (for example, 'Reuss' coupling of elementary units when computing thermal expansion or elastic compliance of a partially oriented polymer).

Taken together, the four parts of the book provide access to the results of a major study of an aspect of polymer behaviour of real practical significance. And the discussion benefits from frequent shafts of the physical and mathematical insight so characteristic of its author. These features alone will make the book a 'must' for serious students of the thermo-mechanical behaviour of polymers. Unfortunately, however, it is not without a few blemishes. There are distracting instances of excessive elaboration of minor experimental matters which seem out of place in a book, and some of the theoretical excursions are dense and apparently lacking in justification. Furthermore occasional, but irritating, editorial slips have crept in [inconsistencies in nomenclature—both terms 'reduced time' and 'effective time' are used for the temperature-modified time-scale—and errors in equations (e.g. equations (16), (21) and (22))]. It is to be hoped that these relatively minor defects will not deter the fainthearted. Struik has provided a thorough survey of an important aspect of polymer behaviour, and this is to be welcomed. The book will certainly find its way onto library shelves as a useful work of reference, and many polymer viscoelasticians will want to possess a copy. Whether it will reach a wider and possibly more important audience—those production engineers grappling daily with the idiosyncrasies of polymers listed in the title—is rather doubtful which is a pity. Perhaps another book is needed to

communicate the message to those outside the research community.

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### High Performance Polymers and Composites:

#### Encyclopedia Report Series

Jacqueline I. Kroschwitz (Ed.)  
John Wiley & Sons, New York,  
1991, 992 pp. + xxviii, £74.35  
ISBN 0-471-54366-7

This book comprises 31 self-contained articles on the science and technology of high performance polymers, including carbon fibres, electrically conductive polymers and polymer composites. Apart from the article on polycarbonates written by a team from Bayer AG, Germany, one article on polymer blends by Paul and his colleagues and another on thermoplastic polyesters by Jadhav and Kanter from the University of Massachusetts, the articles are all written by distinguished scientists, who are working or have worked for the major US industrial organizations such as Du Pont, Hoechst-Celanese, General Electric, Allied-Signal, Monsanto and Phillips Petroleum. Inevitably this rather restricted choice of authors gives the articles a somewhat inbred quality and a strong emphasis on US science and technology. As would be expected from the careful selection of contributors however, the articles are of uniformly high quality. The science is dealt with in a succinct, authoritative fashion, but with no concessions to the uninformed. More importantly, the technological implications are discussed in terms of both processing and product applications. The book is essentially an encyclopedia for industrial scientists and engineers but will also be very helpful to those in academia concerned with the teaching of polymer science and technology.

The text contains substantial reviews of high modulus fibres, including carbon, aramid, polyethylene, silica and alumina-based fibres. Composites are thoroughly covered, with separate articles focusing on properties and applications, fabrication and testing. These are separate reviews of all high performance plastics, including polyesters, polyamides, polycarbonates, polyetheretherketones, polyimides, polysulphones, poly(arylene sulphides) and polybenzimidazoles.

The articles give the reader an excellent historical perspective leading through the science and technology to production processes, the fabrication and applications of plastics, fibres and composites. Practical issues are discussed alongside the funda-

mental science in a very attractive and useful way. The book is an excellent source of information for the practising applied scientists in either industry or academia, who will be informed of the key facts whilst being reminded of the basic science.

In summary, this encyclopedia can be highly recommended for library use, and it is reasonably priced taking into account the comprehensive coverage. It is very well produced, and each article includes a substantial list of references.

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### Polymer Year Book 6

R. A. Pethrick, G. E. Zaikov,  
T. Tsuruta and N. Koide (Eds)  
Harwood Academic Publishers,  
1990, \$190.00  
ISSN 0738-1743

Polymer Year Book was originally conceived by Professor Hans-Georg Elias as a practical current awareness book for active polymer scientists. In the sixth volume the editors continue with this original idea. It is divided into four sections: the first of these is 'Data on Polymeric Materials', the second is a section containing commissioned reviews, the third is a series of short papers under the general title of 'Progress of Polymer Science in Japan', and the final major section, 'Current Awareness', contains lists of recent publications in polymer science.

The first section, 'Data on Polymeric Materials', deals with physical properties, synthesis and applications of thermoplastic polymers. Data are presented on 13 common thermoplastics. For most materials a brief history of the development of the polymer is included along with polymerization details and tables of physical properties. Tabulated properties of a range of copolymer systems are also included in this chapter. The chapter finishes with a large table of data on a very comprehensive list of thermoplastics. These data include values of density, transition temperatures and enthalpies of melting. In addition, there is information on the processing conditions commonly used for commercial thermoplastics.

The review section contains three articles. The first of these is by K. Adachi and T. Kotaka on 'Mechanical and Dielectric Relaxations of Guest Polymer Molecules in Networks'. The second is on 'Functional Polymers' and was written by R. N. Young. Finally, there is a review of 'Polymer Cohesion