

Pobedimskii, Mukemva and Kirpichnikov in giving an account of the effectiveness of organophosphorous stabilizers and tackling the complex question of how they function at the molecular level provide a valuable review of the considerable Russian work in this area.

The compatibility of a stabilizer with a polymer and how readily it can be extracted are factors which are no less important than chemical efficiency in determining the effectiveness of a stabilizer. The final paper of this volume by Luston is a well written and informative review on the physical loss of stabilizers from polymers. The importance of volatility, and how the structure of polymer and stabilizer affects the cohesion forces between them, and hence their compatibility, are discussed.

Luston presents a detailed account of the physical loss of stabilizers from polymers in which a good balance between experimental observation and theoretical explanation is maintained.

Although in the complex field of PVC stabilization science is still at least one step behind technology the view expressed by Professor Scott in the preface that major advances need a sound mechanistic foundation is valid. The papers presented in this volume make a solid and valuable contribution to this foundation.

A. Davis

## Fatigue of Engineering Plastics

Richard W. Hertzberg and  
John A. Manson

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\$35

One of the most striking features of this excellent monograph is that it is so up to date. Many of the references carry the same year of publication as the book itself yet the flow of the text has not been disrupted by the late insertion of new material, nor is there evidence of hurried and careless proofreading. This indicates admirable dedication on the part of the authors, and probably a great deal of sympathy from the publishers. Their reward will be to earn an extension of the period during which this book will remain essential reading for all research workers and graduate students in the field of mechanical properties and fracture of polymers, and advised reading for every designer working with plastics.

Approximately half of the references cited in the book have appeared since the publication in 1973 of a previous review on this subject by the same authors. If work continues apace it is difficult to see how it will be possible to confine any future review to a single volume if it is to retain the same degree of comprehensiveness and objectivity. Hertzberg and Manson have

conscientiously focused on the subject of the title and do not burden the reader with unnecessary background material or discussion of peripheral topics. The book is well-arranged, the treatment of the material is well-balanced, and it is for the most part easy to read. The subject of fatigue of plastics is of course most complex and the authors have quite properly made no attempt to gloss over those areas in which no clear pattern of behaviour has emerged. This sometimes leaves smooth presentation difficult to achieve, but leaves the reader with the task of forming his own conclusions, a valuable attribute for an advanced text such as this.

The authors have made numerous original contributions themselves and are able to write with authority on most of the topics covered in the book, but they properly refrain from emphasizing their own point of view in those areas in which there exists uncertainty. It is natural that they should use their own studies as a framework for much of the text, but this reflects the depth and breadth of their own work, and they give generous exposure to the contributions of others.

Chapter 1, 'Introduction to Fatigue' efficiently surveys stress systems, thermal and chemical effects, strain-rate dependence, notch-sensitivity and modes of deformation and fracture (including crazes and shear bands). Chapter 2, 'Cyclic Stress and Strain Fatigue: Unnotched Test Specimens', addresses the problem of choosing the most appropriate test variables when evaluating the fatigue properties of materials and considers the relevance of the results to field performance. Apart from alerting the designer to the possible problems that may be encountered when using plastics in engineering applications this chapter also gives some positive advice on component design. Chapter 3, 'Fatigue Crack Propagation', starts with an outline of fracture mechanics concepts and goes on to illustrate the degree of success that has been achieved when evaluating polymer crack growth data according to these principles. A useful, if short, section on design is again included. Chapter 4, 'Fatigue Fracture Micromechanics in Engineering Plastics' describes the micromechanisms of fatigue fracture that have been deduced from fractographic studies and indicates the kinds of features to look for when conducting a failure analysis. Chapter 5, 'Composite Systems', extends the discussion to toughened plastics (including copolymers such as ABS and modified polymers such as HIPS), fibrous composites, (with examples of boron and polyaramid filled materials as well as ones filled with glass-fibre and carbon-fibre), and contains short sections on particulate-filled plastics and adhesive joints.

Apart from the omission of a minus sign in one of the equations and some absences from the list of symbols the most serious criticism I have is that the authors have tended to reproduce the units used in the original

sources. Thus stress is expressed variously in ksi, (and KSI!),  $\text{kg/mm}^2$ ,  $\text{lb/in}^2$ ,  $\text{lb(wt) in}^{-2}$ ,  $\text{kg(wt) cm}^{-2}$ , MPa and  $\text{MN/m}^2$ . On p 100 the reader is asked to compare two graphs for which the units of the stress intensity amplitude, (plotted as  $y$ ), are given as  $\text{MPa m}^{\frac{1}{2}}$  and  $10^2 \text{PSI IN}^{\frac{1}{2}}$ , respectively. It is with pleasure that I predict that few people will be deterred by such minor faults.

J. R. White

## Developments in Polymer Photochemistry

N. S. Allen (Ed)

Applied Science Publishers,  
Vol. 1, 1980, pp. 223; Vol. 2,  
1981, pp. 278.

During the last few years *Applied Science Publishers* have made a significant impact on the review literature in polymer science with their 'Developments in' series which now cover subjects ranging from polymerization to polymer technology as well as many non-polymer subjects. These series are now joined by the present volumes which deal with the photochemistry of polymers.

The Editor has rightly taken a broad view of his subject and the seven reviews in each volume range widely covering topics as diverse as photo-initiated polymerization, luminescence spectroscopy, intermolecular energy transfer, photografting processes, photo-oxidation of polymers and photochemistry of dyes and pigments in polymers. The authors are all experts in their fields although it was surprising to find that only one of the fourteen reviews originated in an industrial laboratory, the remainder being from academic or government laboratories.

Of the fourteen reviews in these two volumes, seven are concerned with photodegradation and photostabilization of polymers which means that there is considerable overlap with two other series, *Developments in Polymer Degradation* and *Developments in Polymer Stabilization*. Indeed, many of the authors in the present series have also written for one or both of the others. In view of the relatively small number of people publishing in this field it remains to be seen whether there will be enough material to support three heavily overlapping series in the long term.

The reviews on these two volumes are authoritative and the quality of production is high. For 223 and 278 pages respectively the prices are not excessive and there is much here for anyone interested in polymer photochemistry.

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