

Book Reviews

Advances in Polymer Science 24: Molecular Properties

Springer-Verlag, Berlin—
Heidelberg—New York, 1977,
244 pp, \$37.00, DM 84

This volume comprises four specialized articles on widely differing topics; polymer metal complexes and their catalytic activity (E. Tsuchida and H. Nishide) 87 pages; strain energy density functions of rubber vulcanizates from biaxial extension (S. Kawabata and H. Kawai) 35 pages; e.s.c.a. applied to polymers (D. T. Clark) 62 pages; and polymer separation and characterization by thin layer chromatography (H. Inagaki) 48 pages..

Research in metal complexes bound by a polymer chain is of considerable interest, not only because of their intrinsic catalytic activity, but also from the standpoint of being model compounds of catalytic enzymes. The first article describes (a) the formation structure and characterization of polymer metal complexes and their behaviour in elementary reactions such as complex formation, ligand substitution and electron transfer, and (b) their catalytic activity. Chapters are devoted not only to these topics, but also the reactivity of polymer complexes with molecular oxygen and phenol oxidation catalysed by polymer—Cu complexes.

In contrast to the theoretical interpretation of elasticity behaviour based on the kinetic molecular concept, the phenomenological approach to rubber elasticity has not been so extensively explored or developed. The second article summarizes the typical approaches to the evaluation of the strain energy density function from biaxial extension experiments. The article is not a review but largely summarizes the experimental studies carried out by the authors.

In recent years the technique of electron spectroscopy for chemical applications (e.s.c.a.) has been extended to the study of the structure and bonding in polymers. E.s.c.a. involves the measurement of binding energies of electrons ejected by interaction of a molecule with a monochromatic beam of soft X-rays. The article reviews the background of e.s.c.a. as a spectroscopic technique with special reference to polymers. The advantages and disadvantages of e.s.c.a. are elucidated and the area of application and the results obtained for polymers are summarized. The final article presents recent advances in the application of thin layer chromatography to polymers. After discussing the use of the technique, the determination of compositional heterogeneity of a range of copolymers is reviewed. Other chapters deal with the characterisation of polymers with differing chain characteristics and surveys (a) the effects of monomers sequences in polymer chains, (alternating, statistical etc.) (b) homopolymers with dif-

fering chain microstructures, (c) branched and (d) grafted copolymers on the separation. The final section discusses separation by solubility-controlled mechanisms.

C. E. H. Bawn

Developments in Polymer Degradation:

Edited by N. Grassie

Applied Science, London, 1977,
270 pp, £15.00

In the preface to this book in the Applied Science Publishers 'Developments Series' the Editor clearly states that it is not intended as a comprehensive review but consists rather of a series of articles on limited topics in the field of polymer degradation. Since each author was chosen to discuss one of his own current fields of interest the editor hoped that the book would indicate ways in which polymer degradation studies may advance in the future.

The chapters constituting the first half of the book are concerned with specific techniques. R. H. Still considers the thermal methods of stability assessment and, very importantly, discusses the abuses of these methods illustrating his treatment by reference to polymers used in journal bearings at just over 100°C and those used in rocket tubes at much higher temperatures. I. C. McNeill then reports on thermal volatilization analysis, a technique that he has been mainly responsible for developing.

Conference Announcement

Applied Fracture Mechanics of Polymers

Ingénieurs Civils de France, Paris, 12 and 13 December 1978

A two-day symposium on Fracture Mechanics of Polymers is being organized jointly by the Centre for the Study of Plastics, Paris, and L'Ecole d'Application des Hauts Polymères de Strasbourg. The conference is sponsored by SPE France, the French Section of The Society of Plastic Engineers, and is to be held in Paris at the Ingénieurs Civils de France on 12 and 13 December 1978. The symposium will aim to review existing problems in fracture and crack growth. The programme consists of 8 lectures followed by discussion periods and will cover the following topics: the theoretical study of fracture; fracture and viscoelasticity; fracture analysis applied to the initiation, crazing and growth rate of cracks; comparison of fracture mechanisms in organic and inorganic glassy materials; extension to the polymer field of the work of the Brittle-Fracture group; crack and fatigue in amorphous and crystalline polymers; effect of structure parameters on mechanical strength and brittleness; aging in rigid PVC; application of the Robertson Test to plastics. Further details may be obtained from the Centre d'Etudes des Matières Plastiques, 65 rue de Prony, 75854 Paris Cédex 17, France. Final date for registration: 15 November 1978.

N. A. Weir discusses the changes in the dielectric properties that accompany degradation and weathering and in the 4th chapter D. T. Clark, A. Dilks and H. R. Thomas show how important electron spectroscopy (e.s.c.a.) is likely to be in studies of surface degradation. The next chapter by the editor constitutes a very useful review of the pyrolysis of poly(acrylonitrile) and it is followed by an interesting account of the degradation of polymer blends by I. C. McNeill. The next two chapters deal with photo-oxidation. In considering the autoxidation of hydrocarbons and of PVC G. Scott discusses the importance of unsaturation and the mode of action of stabilizers, while J. R. MacCallum contributes a rather specialist chapter on the importance of singlet oxygen in hydroperoxide formation. In the final chapter, A. Davis gives a critical account of the effects of weathering and in considering exposure trials he discusses the use of poly(phenylene oxide) and polysulphones as monitoring substances.

The book is well produced, it is stimulating to read and should fulfil the editor's hopes in indicating some lines of future development. He is to be congratulated in producing an up to date multiauthored work (references to 1976 are included in most chapters). This book can be recommended to all who are interested in polymer degradation and it is to be hoped that further volumes will be available in due course.

G. S. Park