

ADVANCES IN POLYMER SCIENCE, Volume 32 Springer Verlag, Berlin, 1980.

At first sight, volume 32 in this series is a collection of reviews with widely differing themes which bear little relation to one another. After reading, however, one finds that the editors have succeeded in bringing together three areas which are unified by having both industrial importance and an extensive academic literature.

The first review is by far the most substantial occupying half of the available space. It is a comprehensive discourse by Cesca, Priola and Bruzzone on the incorporation of cyclic trienes in poly(isobutene) and ethylene-propylene copolymers and the subsequent reactions which can be performed at these sites of unsaturation. There is a wealth of data on the synthesis and post reactions including radical grafting and crosslinking, and Diels-Alder reactions, which should prove invaluable to those specifically interested in the field, but it is a review mainly for the specialists.

In the second review, Stannett, Koros, Paul, Lonsdale, and Baker have provided a broad brush treatment of recent work in membrane science and technology. There is coverage of gas sorption and transport in polymers, above and below the glass transition temperature, highlighting current thinking on dual mode sorption, followed by a description of gas separation using membranes. The latter has become an important method for extracting fuel gases from mixtures and some remarkable permeability ratios are quoted. Combination of this and hollow fibre technology can lead to commercially viable systems. The applications of membranes in reverse osmosis, ultra filtration, microfiltration and the preparation of liquid and special composite membranes are of particular interest. Good coverage of controlled release systems, both monolithic and reservoir devices, in medicine and agriculture, is followed by a final section on removal of residual monomer from fabricated items where there are health hazards. It is a wide ranging, informative and interesting chapter for the general reader.

The final contribution by Henriç Olivé and Olivé deals with polyacrylonitrile and some of the important intermolecular interactions influencing the behaviour of this material. The effect of strong dipole-dipole interactions on the stress response, glass and melting temperatures is covered first. The authors then concentrate on aspects of hydrogen bonding and water structure and their influence on the polymerization process and the behaviour of the polymer as a fibre. This is followed by an account of electron donor-acceptor complexes involving the nitrile group and Lewis acids.

The volume maintains the usual high standard of this series and should be a must for libraries, but the diversity of content will deter personal purchase.

J. M. G. Cowie

ADVANCES IN POLYMER SCIENCE, Volume 33, **'Electrical Phenomena in Polymer Science.'**

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This, the thirty third volume in the 'Advances in Polymer Science' series, deals with the topic of Electrical Phenomena in Polymer Science by way of four isolated contributions from different authors. The reader will be disappointed should he approach the text in expectation of finding a comprehensive treatise on polymer electrical phenomena. It is not. Rather, the title serves as the most concise description of the common subject area for the four specific papers.

The first contribution is from the pen of Dr G. Mengoli of Padova, Italy and is entitled 'Feasibility of polymer film coatings through electro-initiated polymerization in aqueous medium'. Here, the author surveys the scientific literature and discusses the feasibility of and the current procedures used in the modern development of forming protective polymer coating on metal surfaces by direct electropolymerization on the surface. Much of the description is given by comparison with the more commonly used process of electrophoretic deposition. Particular emphasis is laid upon aqueous polymer media and on the kinetics of coating formation. The article should be a good starting point for the development engineer who wishes to learn about surface electropolymerization.

The same topic forms the subject of the second contribution by R. V. Subramanian of Washington State University. Under the general title of 'Electroinitiated polymerization on electrodes', this author gives a readable description much more from the viewpoint of the structure and morphology of the deposited polymer. He reviews mechanisms of polymerization and tries to relate them to the final adhesion properties of the polymers. Coatings formed from vinyl, phenol, acrolein, benzonitrile, polyimide and phenylacetylene monomers are all discussed in some detail. A topical and interesting discussion of carbon fibre electrodes is also given.

Half way through the volume a transition occurs. Just as the reader is getting 'stuck into' polymer metal adhesion, the material 'relaxes' into dielectric relaxation studies for the third and fourth articles. Professor G. Williams of Aberystwyth supplies the first of these with a paper entitled 'Molecular aspects of multiple dielectric relaxation processes in solid polymers'. These phenomena are discussed for both amorphous and crystalline polymers. Models are given for the various modes of motion in terms of dipolar relaxation theory. The novelty of the article lies in its attempt to present a clarified, comprehensive description of relaxation processes in terms of time correlation functions rather than from a partial or full consideration of the polymer chemical

structure. With such an approach, the author is able to indicate and highlight the characteristics of solid polymer electrically excited relaxations.

As a readable review and a description of general polymer dielectric behaviour, the final contribution by Dr H. Block of Liverpool University is worth waiting for. Under the title 'The nature and application of electrical phenomena in polymers', the author follows a general description of the dielectric properties and relaxation processes in polymer solutions with an interpretive account in terms of polymer structure and motion. From this standpoint, the author proceeds to a description of electrically induced process in solid polymers. Sections then appear on thermally stimulated electrical discharge, piezo- and pyro-electric polymers, conducting polymers and photoconductivity in polymers. Each of these topics is discussed in terms of molecular structural characteristics and assessed for their practical utility. This is an excellent article for the newcomer to the basic dielectric properties of polymers who wishes to know what is important and relevant at the present time.

Overall, the dual nature of the material in the book is disappointing. It would have been far more useful as a single volume devoted to either of the major topics discussed. As it is, it simply provides a repository for four relevant review articles in specialized areas of polymer dielectrics.

B. R. Jennings

ADVANCES IN POLYMER SCIENCE, Volume 37, **Cationic Ring-Opening Polymerization of Heterocyclic Monomers** *S. Penczek, P. Kubisa and K. Matyjaszewski* Springer-Verlag, Berlin, 1980

Volume 37 of this well established series consists of one long article (156 pages). The authors deal in considerable detail with the mechanisms of the reactions involved in the ring-opening cationic polymerization of heterocyclic monomers, although in practice most of the discussion is concerned with the much studied example of tetrahydrofuran. After a brief introduction the review is divided into sections on Monomer Structures, Ring Strain and Nucleophilicities; Initiation; Propagation; and Termination and Transfer Processes. The literature is covered through to the end of 1979 with a few references from early 1980.

The authors present their critical analysis of knowledge in this area with convincing thoroughness and both specialists and the general reader will find the review stimulating.