

## Synthesis and Separations using Functional Polymers

*D. C. Sherrington and P. Hodge (Eds.)*

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Ten years ago the use of polymers as supports for organic reactions could be regarded as an exciting new development. Today the subject remains exciting but there is now an extensive literature and regular symposia in the field and an important technology based on the use of polymer supports. The same authors provided a useful review volume, 'Polymer-Supported Reactions in Organic Synthesis', in 1980 and the present book is to be regarded as a sequel, both updating topics previously considered and introducing new topics. The contributors are all distinguished researchers in the particular application of functional polymers which they discuss.

In the opening chapter, Guyot considers the synthesis and structure of polymer support, concentrating mainly on styrene-based polymers and on control of important parameters which determine behaviour. The second chapter (Hodge) is the longest in the book and considers organic reactions using polymer-supported catalysts, reagents or substrates. A broad general view of the whole area is given, in which some recent advances are highlighted. The remaining chapters are shorter and (apart from the last) more sharply focused on specific aspects. Carron and Gates examine polymer-bound transition metal complex catalysts. Widdecke discusses design and industrial application of polymeric acid catalysts, with the emphasis on polystyrene sulphonic acid resins. Tomoi and Ford contribute a chapter on polymeric phase transfer catalysts, i.e. materials which catalyse reaction between immiscible reactants by transfer of one of the reactants at the interface. Neckers discusses properties of polymeric Rose Bengals—polymers as photochemical reagents. Such a material acts as an immobilized photosensitizer and has a particular use for the preparation of single oxygen. Van den Berg and Challa deal with enzyme-like polymers and Jervis considers polymers in affinity chromatography, used as a protein purification technique. Pickle and Mahler discuss chiral polymers in separation of enantiomers and Warshawsky presents a chapter on polymeric ligands in hydrometallurgy. In the final chapter,

Sherrington presents a wider perspective of polymer supports and reactive polymers.

This attractively set book is informative and stimulating and can confidently be recommended to polymer chemists and others who wish to keep abreast of developments in a fascinating area of polymer chemistry.

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## Electrical and Electronic Properties of Polymers. A state-of-the-art compendium

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The size and cost of Wiley's Encyclopedia of Polymer Science and Engineering precludes it from the bookshelf of the average scientist or engineer. And so it is to be found mainly in the reference section of larger libraries. The breadth and depth of coverage encompassed by the encyclopedia means that particular groups of articles are consulted by individuals selectively according to specialization. The publishers have recognized this and have brought together articles concerned with particular areas of widespread interest. One such area is electrical and electronic properties of polymers.

The book comprises 10 chapters by expert authors. Five of these chapters are substantial contributions of 40 pages or more. The authors have adopted a common approach lying between textbook and academic review. Each contribution begins with an overview of fundamental principles leading to a review of recent discoveries, inventions and techniques, finishing with a comprehensive bibliography. The mixture succeeded, allowing me to grasp some advanced, unfamiliar topics with relative ease. The process was helped by the absence of mathematics, the general thrust being conceptual.

The book divides into three parts of approximately equal length. There are three chapters devoted to the electrical and electronic characteristics and applications of polymers, three to their optical properties and uses and four to electroactive polymers.

The three chapters dealing with electrical characteristics begin with a comprehensive outline of the electrical

properties of polymers. Theoretical aspects are dealt with efficiently followed by an outline of the standard tests used in the characterization of electrical behaviour. The breakdown and degradation of polymers in high fields is dealt with in a refreshingly practical but not trivial manner. Tracking, discharge erosion, electrical and water treeing and thermal ageing are all admirably described and explained. Whilst these topics are inclined to high power applications aspects closer electronic interests are dealt with equally effectively. There is comprehensive coverage of high frequency, a.c. characteristics with particular regard to loss factor. Less attention is given to static electrification which is surprising considering the principal role played by polymers in its generation and the damage it does to modern high impedance circuits. The chapters concerned with electrical aspects are completed by applications orientated sections which describe how conducting polymers can be used to suppress e.m. radiation and the use of polymers as encapsulants, adhesives and tapes. Much of the information provided on these latter topics is remarkable for its blandness and is obtainable in any respectable electronics catalogue.

Electroactivity occurs in polymers with conjugated  $\pi$ -electron backbones. Two of the most interesting are polyacetylene and diacetylene polymer. Their synthesis and chemistry are described in two chapters whilst the physics and chemistry of electrically conducting and photoconducting polymers are described in a further two chapters. By virtue of its commercial pre-eminence polyacetylene features prominently in explaining conducting polymers but not at the expense of less exotic, composite polymeric conductors. Photoconductivity is dealt with in less detail.

Polymers play an important part in optical technology as recognized by the three chapters devoted to it. They have been used for many years in the lithographic reproduction of macro and micro circuits; the techniques of both are described. The birefringence effects exhibited by polymers are reviewed over two chapters where their application to the measurement of strain and modulation of coherent light are duly considered. So too are exciting developments in the use of polymers for the optical storage of data. But these modernistic applications are not allowed to overshadow the important applications of polymers in the production of refractive articles.

In summary, the book achieves its aim of providing a valuable advanced reference source. It contains chemistry useful