

Microdomains in Polymer Solutions

Paul Dubin (Ed.)

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xiv + 457 pages, \$75
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The laminate material (polyvinylbutyral) used in the manufacture of automobile windscreens and the haemoglobin (HbS) found in the blood cells of people with sickle cell anaemia may not on casual acquaintance appear to have much in common, apart from both being macromolecules; however, they are both macromolecules that show aggregation phenomena in solution and, despite their diverse origins, fall into the expanding category of polymers forming microdomains in solution. In the early years of polymer solution theory polymers that aggregated, particularly at low concentrations, were to be avoided if the beloved parameters relating to the conformations of individual molecules were to be extracted by the application of physical methods such as viscometry and light scattering. It is a reflection of developments in both experimental methods and the theories applied to polymer solutions that there is now apparently no difficulty in bringing together authors for 25 articles on various aspects of the study of microdomains in polymer solutions.

This volume is a collection of refereed papers presented at a symposium held in Las Vegas in 1982. The papers are grouped in five parts under the headings intramolecular micelles; association, aggregation and gelation; ordering in polyelectrolyte solutions; microdomains in non-aqueous media; and, finally, ordered polymer-ligand complexes. The latter part is subdivided into systems with biological components and synthetic systems. The papers are written in conventional style with abstracts and experimental details and contain original data presumably not previously published in conventional journals.

A very wide diversity of materials is covered, each of which have their devotees in quite different areas of polymer science. The general reader, like the reviewer, will probably find a proportion of the articles of direct interest. There are, for example, five papers on intramolecular micelles, three on ordering in polyelectrolyte solutions, one of which by Paoletti, Crescenzi *et al.* is devoted to consideration of the thermal effects associated with conformational transitions and interactions in ionic polysaccharide solutions based on the

counterion condensation theory of G. S. Manning. This substantial article (30 pages) will be of interest to those concerned with microcalorimetry of macromolecules. Of the four papers dealing specifically with biological materials, interactions concerning DNA, poly(L-lysine), and phospholipids with surfactants or polysoaps are considered. There are six papers that encompass synthetic polymer-ligand interactions in aqueous solution, which are largely concerned with the problem of the binding of surfactants to polymers and the effects of such binding on the conformation of the polymer and the physical properties of the resulting complex solutions.

The papers are all of a good standard and the book, although produced by the camera-ready copy method, has a uniformly pleasing appearance. It contains biographical details of the authors and a short but adequate index. The Editor has carried out a useful service for those interested in microdomains and although like many volumes of this type many private purchases are unlikely, the work should be present in any well-founded polymer science library.

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Polymer Permeability

J. Comyn (Ed.)

Elsevier Applied Science,
London and New York, 1985,
viii + 383 pages, £45.00
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Even for one specialized topic within polymer science it now seems essential to invoke the separate expertises of several specialists and hence books of multiple authorship have become the norm rather than the exception. In his short, but pointed, Preface the editor indicates that this book aims to provide timely, applied aspects of polymer permeability. In fact the final six chapters do fit this description, the first three being of a rather more fundamental nature. There are eight contributors.

A brief introduction to the mathematics of diffusion and permeability is given by the editor himself in chapter 1. There is some slight duplication of this in the following more substantial section by Rogers on 'Permeability of gases and

vapours in polymers'. In addition to considerations of relevant properties of the penetrant and polymer, this chapter also includes illustrations, by means of tabulated permeability coefficients (at about 25°C), for several polymer films to gaseous oxygen and water vapour as well as for a butadiene-acrylonitrile rubber to several widely different types of penetrant. The oddly named Case II adsorption is characterized by sharp, step-wise penetrant profiles moving inwards from the surface with constant velocity. In chapter 3 Windle presents an excellent review of this topic together with an interesting historical aside on the origin of its name.

The titles of the remaining chapters testify to their topicality and importance, namely 'Effects of oxygen permeation and stabiliser migration on polymer degradation' (J. Y. Moisan), 'Diffusion and adhesion' (J. Comyn), 'Role of polymer permeability in the control of drug release' (J. H. Richards), 'Permeability and plastics packaging' (R. J. Ashley), 'Permeability of coatings and encapsulants for electronic and optoelectronic devices' (M. T. Goosey) and 'Role of water transport in composite materials' (G. Marom).

Finite permeability is desirable in drug release. In contrast, for most of the other applications reviewed the permeability is a disadvantage. Thus diffusion of water along the glue line on a polymeric adhesive joint causes cracking, crazing or hydrolysis. As indicated in chapter 7, some form of compromise may be necessary, since the ideal packaging material for fresh fruit and vegetables is one having low permeability to water vapour but high permeability to oxygen. All the more reason, therefore, for a clear understanding of the scope of the problems involved and a modern approach to their solution. In these respects the book can be said to be eminently successful.

It is only natural that certain individuals (including the reviewer) may be disappointed by the absence of their own particular sphere of interest. However, in the broader context the coverage selected by the editor is a good representative one. The text is unusually readable and lucid throughout, and this book is strongly recommended. Very slight criticisms are incomplete labelling of some of the diagrams, a serious error in equation 25 (p.158) and a rather inadequate Index.

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