Anderson is a study of biocompatibility using a steel cage in which polymers are implanted into animals. Polymers used include a hydrogel (polyamino acid), a polyurethane, a silicone rubber and PVC. The exudate forming in the cage is monitored and examined for biochemical changes during the period corresponding to inflammatory and early healing stages. A quantitative assay of the response is thus possible. S.e.m. studies of the polymer surfaces complement the biochemical assay. Relationships between the polymer response are discussed.

Six chapters deal with controlled release systems. Chien discusses the science and engineering of systems already established in the market dealing with membrane permeation, matrix diffusion, microreservoir dissolution, osmotic-pressure-activated, hydrodynamic-pressure-activated, magnetism- and ultrasound-activated and pH or ion-activated delivery systems. This is useful for the understanding of later chapters. Fibrous systems (Dunn *et al.*) based on polycaprolactone have drugs incorporated before the fibres are melt-spun. Antibacterials were satisfactorily employed. Transdermal delivery is very attractive and several systems are commercially available, for example, for nitroglycerin treatment of angina. The paper by Gaskill *et al.* discusses membranes used. A diffusion controlled system using ion exchange is the subject of a paper by Raghnathan *et al.*, with glassy polymers being treated in the contribution from Lee, who uses cross-linked hydrogels. Balazs, in contrast, uses porous media and discusses the kinetics of different simulated pore systems.

Anti-cancer drug delivery is the theme of the next seven chapters, beginning with an overview by Ghosh and Maiti. Many anti-cancer drugs are highly toxic to normal living cells, and if a controlled release system can be used, this systemic toxicity should be reduced, and more site-specific action obtained by targeting to the affected location. Acrylic polymers (Hartshough & Gebelein) and halogenated nucleic acids (Alderfer *et al.*) are matrix polymers used in the next chapters. To evaluate the various systems *in vivo* toxicology (Baldwin *et al.*) and cell culture (Giron *et al.*) have been used. In cancer treatment site-specificity is needed and Carraher *et al.* address this in platinum agents carried in polyvinylamine-co-vinylsulphonate matrices.

The next three chapters cover solubilization of drugs in which polymers are used, for example, to assist with drug particle size control or crystal form (Pitha). Iron-chelating polymers (Winston *et al.*) based on polyhydroxamic acids are potentially useful for iron poisoning or anaemia treatments. Osmium carbohydrate polymers were tested for reactivity to superoxide ion and may be used in the future as anti-inflammatory agents to protect cartilage. Hodnett then presents a chapter on polymers to stimulate interferon production. Polynucleotides and complexes thereof and polycarboxylic polymers are considered. This is an interesting and potentially very powerful area in medicine.

The final chapters deal with polypeptides as drugs. Samanen gives a detailed overview of the subject. Sarawathi & Keyes deal with catalytic activity in proteins, and then Hudecz *et al.* look at synthesis of branched polypeptides with a poly(L-lysine) backbone.

The overview chapters were very useful in such a book as this, but the polymer chemist will in any case find much to stimulate and inform.

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Bioactive Polymeric Systems: An Overview

C. G. Gebelein and C. E. Carraher, Jr (Eds.)
Plenum Press, New York, 1985, xxiv+689 pages, US$114, £71.85, ISBN 0-306-41855-X

Thirty-four contributors have produced the 22 chapters of this book, which deals with bioactive polymers, i.e. those that show the 'interaction of some agent, usually chemical on a biological system'. This definition for bioactivity includes drug action herbicides, insecticides and antifertility agents.

The topics covered are biocompatibility, pesticides, plant growth regulators, controlled drug release, polypeptides in drug delivery, animal repellants, affinity chromatography, reagent immobilization, immobilized enzymes, biomedical polypeptides, protein/peptide drug carriers, polysaccharides, interferon induction by polymers, synthetic nucleic acid analogues, enzyme mimetic polymers, carboxylic acid polyanions, antitumour agents, platinum derivatives, iron complexing polymers and metal-containing macromolecules. The contributors are well known in their particular fields.

It is a large book with a spread of topics. As an overview, then, it fulfils its purpose and forms a useful reference work for the subject of bioactivity and polymers. There may be much that would not be relevant to the needs of those working in a specific field. As a stimulus to new thinking and 'technology transfer', this is not a bad idea and the first two chapters are useful in that regard, as a review of the subject and of biocompatibility, although the second chapter is quite short. The chapter on hydrogels for controlled drug release, by Kim, presents the types of system that can be developed, but is also a short chapter. This fulfils the aim of the editors to provide 'brief, introductory reviews' to give a scientist 'basic and relevant information in fields other than his or her own speciality'. By grouping the chapters into controlled release systems, special techniques, natural polymer, pseudo-natural polymer and synthetic polymer systems, this aim can be achieved. However, there is a disparity in chapter length and content, and whilst the more detailed chapters are valuable, the shorter ones are less so.

As an overview, it is a useful book and is recommended.

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Polymer Yearbook 3

R. A. Pethrick (Ed.)
Harwood Academic Publishers, Chur, 1986, xiv+377 pages, £19.70, ISBN 3-7186-0341-1

A good yearbook should be a helpful companion. It should remind you of the things you have forgotten twenty times already, be a source of up-to-date information and, at the same time, stimulate and entertain. Polymer Yearbook 3 is all of these things, continuing in the tradition established by the first two editions.

The expanded reference sections include a detailed exposition of chemical nomenclature and abbreviations, relevant SI units and the fundamental constants, and a summary of physical properties of common polymers. Newly included in this edition is an extended summary of compositions, trade names and producers of polymers. The current-awareness sections include compilations of recent books, including a selection of 100 from the USSR, a listing of dissertations on polymer science and a selection of review articles. There is also a formidable list of 66 journals covering macromolecules, including names of the editors and publishers and giving their addresses. The calendar of meetings is necessarily incomplete in a bound volume such as this. As most readers will already have listings such as those produced by

Macro Group UK this is perhaps not an essential section.

Over half the yearbook is devoted to six review articles, including three very welcome contributions from the USSR. D. C. Sherrington describes the rapidly expanding field of polymeric reagents, polymeric protecting groups and polymer-supported catalysts. V. V. Korshak and A. L. Rusanov review the latest developments in the chemistry of polyheteroarylenes. The thermal degradation of polymer/additive systems is discussed in an article by I. C. McNeil; this theme is continued in a review of the kinetics of the degradation of polymers by G. E. Zaikov. Recent developments in the study of the effects of electric and magnetic fields on structural transformations in liquid crystal polymers are reviewed by N. A. Platte, R. V. Talroze and V. P. Shibaev. Finally, D. Durand compares the different theoretical approaches to polymer network formation and discusses those aspects which help in the understanding of the gelation process.

Polymer Yearbook 3 has found a permanent place on my desk (at least until the next edition!) and it should appeal to a very wide range of polymer scientists.

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Polyvinyl Chloride Degradation

Jerzy Wypych
Elsevier Science Publishers, Amsterdam, 1985, x + 264 pages, US$73.25,
ISBN 0-444-42549-7

My first impressions were extremely critical, in feeling that another publication on polyvinyl chloride degradation or thermal stability was surely unjustified. There can be few polymer scientists who have not at some stage or other attempted to unravel the mechanism of dehydrochlorination, or the action of stabilizers, on PVC as exemplified by the copious literature on a problem which dates back to the 1930s. Nevertheless, I have to confess to being impressed with the way the author has succeeded in developing his subject, and to admit that this is a major contribution to a difficult topic.

The subject matter is well developed:

Chapter 1 deals with the chemistry, molecular structure and morphology of PVC, with particular reference to defect structures as sources of weak links, and initiation sites;

Chapter 2, the kinetics of the dehydrochlorination reaction, the initial stages, and the effect of evolved products, unsaturation and presence of oxygen;

Chapter 3, other degradation procedures induced photochemically, by irradiation and by chemicals, and compares and contrasts the mechanism of dehydrochlorination involved;

Chapter 4, the mechanisms of stabilization and the nature of synergism;

Chapter 5, the effect of diffusion of volatiles, and the effect of molecular dynamics and microstructure on the rate of volatile evolution.

This is a most stimulating chapter and suggests that more could be done in determining effect of morphology, amorphous/crystalline ratios and diffusion rate measurements in understanding the mechanisms.

Chapter 6 is particularly useful in summarizing the analytical techniques that have been adopted in thermal degradation studies on PVC, and the effect of chemical modification.

In conclusion, the monograph is thoroughly recommended. It deals with the subject matter differently from any other and is refreshingly novel. It is clearly aimed at the specialist, but most chapters could be read by students of polymer science.

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