dominates thermodynamics at all the important moments in membrane formation. This chapter also contains a brief account of thin-film composite membranes.

Finally, three short chapters deal with membranes made from pure polymers by mechanical processing and track etching, liquid and dynamic membranes, and biological membranes leading up to polymerized vesicles.

The book is well produced and has a subject index only. It would have benefited by having a section describing the technology of membrane production on the industrial scale. Space could have been made for this by omitting the sections relating to ion-exchange membranes and their uses. They are better treated in other books.

Despite these comments the hard work of Dr Kesting has put in to update his first book should be welcomed by all membrane scientists who will deprive only themselves if they do not take full advantage of its many virtues.

P. Meares
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Encyclopedia of Polymer Science and Engineering

J. I. Kroschwitz, H. F. Mark, N. Bikales, C. G. Overberger and G. Menges (Eds.)
John Wiley and Sons, New York, 1985, 906 pages, US$240, £170,
ISBN 0-471-89540-7

Some 23 years have elapsed since the initial publication of this multi-volumed work, and the appearance of a new edition is a major event in polymer science.

This encyclopedia has been the major reference work on polymers for the past two decades, and the new edition, which has been completely rewritten and extended, reflects the great changes that have occurred. The encyclopedia will remain the prime reference work on polymers and their technology and engineering applications. The new edition will comprise 19 volumes of about 850 pages each, and the series is scheduled to be completed by mid-1989.

The topics in the first volume – A to amorphous polymers – include many articles of major interest to both polymer scientists and technologists. A few of the many outstanding articles that may be selected for their special interests are: abrasion and wear; acetal resins; acoustic properties; acrylic polymers, elastomers and fibres (270 pages); acrylonitrile polymers (182 pages); adhesion and adhesives (100 pages) and amorphous polymers (182 pages).

The standard of the individual articles – some of which rank as the equivalent of a text book in size and content – is uniformly excellent, and all are authoritative and well produced. The volume as a whole is very satisfactory, and will undoubtedly grow in usefulness with the publication of subsequent volumes.

This series will undoubtedly be a welcome, valuable, and essential addition to all scientific and industrial libraries.

C. S. H. Bawn
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Polymer Products: Design, Materials and Processing

D. H. Morton-Jones and J. W. Ellis
Chapman & Hall Ltd., London, 1986, xvi+345 pages, £19.95,
ISBN 0-412-27130-3

The aim of this book is to introduce students to many aspects of polymer engineering by the novel use of actual illustrative examples. Case studies of successful products are presented, which include details of design, the selection of materials and the manufacturing process. It is hoped that difficult concepts introduced by means of relevant practical applications will be easier for students to grasp.

The book derives from a project undertaken at the University of Lancaster and is one of a number of initiatives taken by the SERC to integrate more fully academe and industry, a weakness in Britain highlighted by the Finniston Report. It is all too easy for lecturers, particularly those who have themselves become remote from industry, to resort to theoretical rather than applied topics. Furthermore, most students find it easier to become skilled in reproducing and manipulating mathematical proofs than tackling real technological problems. Such circumstances can lead to a rather undemanding educational process, but which is apparently cloaked in academic respectability. By providing this collection of case histories both the authors and the sponsoring body clearly hope to break the mould and encourage the development of problem-solving skills.

Altogether there are some two dozen case histories of very varying nature. They include the design of injection-moulded clips and gear wheels, a washing machine tank made from glass-coupled polypropylene structural foam, printed gaskets for hydraulic control equipment, a high-speed train cab, DMC vehicle headlamps, a mine belt 28.8 km in circumference, a blow-moulded acid container and heat shrinkable terminations for cables. A wide variety of polymer processes are encountered, whilst many facets of polymer science as well as conventional chemistry, physics and engineering are invoked.

Very sensibly, the authors have grouped the case histories, for example, the first group all involve injection moulding, the second are all foam core mouldings, and the fourth glass-reinforced plastics. Each collection is preceded by a short chapter outlining relevant aspects of polymer science and technology. One of my few criticisms is that of necessity such outlines are very brief and I believe that the more inquisitive reader would appreciate more references to detailed background reading.

Sometimes I found it rather difficult to follow the written description of a process or product and a few more illustrations should have made things clearer. My uncertainty here is that I found some of the diagrams confusing. For example, the homofocal lamp drawings on pp. 202–3 left me quite baffled.

Notwithstanding these criticisms I believe that the authors are to be congratulated on their contribution to the literature, and one can only hope that this turns out to be only the first of a series of similar publications.

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Polymer Science and Technology, Vol. 32: Polymeric Materials in Medication

C. G. Gebelein and C. E. Carraher, Jr (Eds.)
Plenum Press, New York, 1985, viii+302 pages, US$63, £39.38,
ISBN 0-306-42115-1

This book is based on the proceedings of an ACS Polymer Materials Division Symposium and comprises 22 chapters. An index and full details of contributions are included.

Beginning with methodologies (Gebelein) and body tissue reactions (Marchant & Anderson) the reader is prepared for the remainder of applications chapters. The introductory chapter is a useful outline of systems in vogue. The chapter from Marchant and

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.

G. W. Hastings
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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