

Polymer Processing

D. H. Morton-Jones
Chapman and Hall, UK, 1989,
xi + 260 pages, £16.00
ISBN 0-412-26700-4

This book is a student text concerned with the basic principles of polymer processing. The first two chapters deal with the basics of polymer science and the physical properties of polymer liquids. The remaining chapters are concerned with mixing and polymer processing techniques such as extrusion, blow moulding, thermoforming, injection moulding, rubber technology, composite fabrication and PVC technology.

The book is well presented with clear text, diagrams and tables. Some chapters have a large number of references and details of further reading whereas others are rather thin on references. However, this may be a reflection of the variation of the level of knowledge in the different areas covered. The approach adopted is somewhat empirical and it would be expected that rather more mathematical details would be given in a student text, as is found for example in 'Plastics Engineering' by Crawford. One important omission is the lack of worked examples (except in Chapter 2) and questions at the end of each chapter. They are really essential in a modern student text.

This book by Morton-Jones is a useful addition to the Chapman and Hall series of polymer science and technology text books. They are reasonably priced and have captured a significant part of the market in this important area.

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Analysis of Polymers

T. R. Crompton
Pergamon, Oxford, 1989, viii + 362
pages, £45.00
ISBN 0-08-033942-5

This book contains a large amount of information relating to the analysis of polymeric materials abstracted from an extensive literature base (1086 references). Most of this work relates to the 1960s and 1970s with very few references post 1980. This does not detract from the value of the book but it is unfortunate that it is not more up to date. Some of this work has already been covered in the author's previous book ('The Analysis of Plastics'). Here the subject matter was broken down according to a particular polymer or

group of polymers whilst this new book is organized according to the type of information required by the analyst.

The book is divided into nine chapters plus an extensive list of references. The first chapter is of an introductory nature, briefly describing the types of polymers used commercially. It contains two very useful tables listing the properties and uses of a large number of polymers. Chapter 2, although rather brief, discusses the elemental analysis of polymers by both chemical and instrumental methods. Chapter 3 goes on to discuss the determination of functional groups in polymers by both chemical (e.g. bromination, hydrogenation) and physical techniques (e.g. n.m.r., i.r.). Chapter 4 presents various quick, simple tests for 'fingerprinting' polymers and concludes with instrumental methods such as i.r. and pyrolysis/gas chromatography. This latter technique is presumably a 'pet' technique of the author. It is described and applied extensively throughout most of the chapters in the book. Although useful in some circumstances it is not all that common in laboratories involved in polymer analysis and is overemphasized in this book. Chapter 5 deals with the determination of the microstructure of polymers. It is the largest chapter in the book containing more than 100 pages. Details of methods for the determination of unsaturation, branching, copolymer composition, sequence distribution, tacticity, and end group analysis are presented with appropriate examples taken from the literature. I.r. and n.m.r. (both ^1H and ^{13}C) are extensively referred to in this chapter. Chapter 6 deals with the thermal methods of analysis including thermogravimetric, differential thermal, differential scanning calorimetry, thermal volatilization and thermomechanical analysis. Thermchemical analysis (pyrolysis/g.c. again) and oxidative stability are also included. The techniques are dealt with very briefly and the chapter is rather short (14 pages) for such important polymer characterization techniques. Methods for the determination of molecular weights are presented briefly in Chapter 7. Fractionation procedures and the measurement of gel content are described along with a very brief summary of osmometry, light scattering and viscometry. The section on g.p.c. describes an instrument equipped with a dielectric detector. This is a very uncommon type of detector and is not normally encountered in polymer analysis. A refractive index detector is the standard detector for this work.

The final two chapters deal with the analysis of additives which may be

present in polymers. Non-volatile additives are covered in Chapter 8. This is a large chapter (67 pages) covering both direct determination of additives in a polymer and the various extraction procedures for removal of additives from the polymeric matrix. A wide range of techniques, both chemical and physical, for the subsequent analysis of these additives are then described. The chapter is poorly organized and the material presented in a rather disjointed fashion. The concluding chapter describes methods for the analysis of volatile component in polymers. Head space/g.c. is the most important technique but u.v., polarography and h.p.l.c. are also included.

In conclusion, the book contains a large amount of information and an extensive list of references relating to the analysis of polymers. Some of the information is difficult to find and it is unfortunate that the reference list is not more up to date. However it will be a useful reference book for laboratories involved in analysing polymeric materials.

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Handbook of Fiber Science and Technology: Vol. III. High Technology Fibers Part B
M. Lewin and J. Preston (Eds)
Marcel Dekker, Inc., New York,
1989, xx + 332 pages, \$180.00

The present volume forms one of the five volumes comprising the Handbook of Fiber Science and Technology and is one of two volumes devoted to High Technology Fibers. It contains nine chapters, each of which provides an up-to-date review of the situation for a wide range of new materials. In the second chapter there is a comprehensive review of one of the major developments of the last 20 years, the invention and widespread application of Kevlar fibres. This is very well presented by a team from Du Pont and it is very exciting to learn of the many and varied successful applications of this material. This chapter is preceded by new contenders in the aramid fibre range, the aramid copolymer fibres and in particular Technora fibre from Teijin.

Chapter 3 describes another potential competitor to Kevlar, the thermotropic copolyester fibres invented by Hoechst-Celanese which are marketed as a thermoplastic under the trade name Vectra. This chapter gives an excellent