

Book Review

The Analysis of Plastics. T. R. Crompton. Pergamon Press, Oxford, 1984, pp ix + 445, ISBN 0-08-026251-1, £29.50.

The main aim of this book is to present an up-to-date and thorough exposition of the art of analysing plastics by chemical and physical methods. There are eight chapters, each a review of the techniques for the analysis of either a particular polymer, such as polypropylene, or a class of polymer, such as the higher alkenes. Information is also included on the analysis of components of plastics other than the polymer itself. Such components comprise not only impurities such as water, organic solvents, monomers and residues of catalysts, but also compounds such as antioxidants, plasticisers, mould lubricants and fillers that are added deliberately by the manufacturer to modify the physico-chemical and mechanical properties of polymers and to enhance their stability.

In each chapter, chemical methods are described for the determination of elements such as sulphur, nitrogen, iron and cadmium; limitations and practical difficulties are highlighted. Physical methods include various spectroscopic techniques (for example, NMR, ESR and Raman spectroscopy), and the application and potential value of such methods in elucidating the structure of polymers and co-polymers is discussed. The uses of pyrolysis-gas chromatography and of gas chromatography-mass spectrometry are also considered. Many other approaches are mentioned, including radiochemical methods, X-ray diffraction techniques, differential thermal analysis and differential scanning calorimetry; there are also sections on polymer fractionation and methods of determining molecular weight.

The contents of this book reflect the author's considerable practical experience in the development of analytical methods for plastics and especially his painstaking zeal in collecting and collating a vast amount of published information; nearly 2800 references are quoted in the bibliography, although few relate to work published since 1979. A useful feature of the book is that some important methods are described in sufficient detail for the analyst to apply the technique without the need to consult the original literature. The principles of many other methods are outlined clearly and succinctly in one or two paragraphs. The author has devised excellent tables which summarize the analysis of additives to particular polymers. The judicious use of tables might have been extended to other sections of the book; for example, miscellaneous methods for polyolefins (pp. 60-62) might have been better summarized in tabular form than by the inclusion of numerous, terse descriptions. On the whole the diagrams, graphs and spectra are clearly drawn and well labelled and should be readily understood by the reader. A minor criticism is the inclusion of a photograph (p. 57) of a photo-electric turbidimeter without an adequate description of its working parts. The table of contents is helpful but a book of this nature merits a more comprehensive index.

This volume is essentially a book for reference rather than a textbook and it will certainly find a place on the library shelves of companies in the plastics industry; it will be consulted in those academic and research institutions involved in the study of the chemistry and technology of polymers. Those analysts who are called upon to examine plastic containers for medicines or devices for implantation in the body will find useful information, practical guidance and relevant references in this book. However, the work of many pharmaceutical and biomedical analysts is often concerned more with additives to plastics than with polymers; to such analysts another book by the same author (*Chemical Analysis of Additives in Plastics*, 2nd edition, 1977, Pergamon Press) is of greater value.

G. Smith