



ELSEVIER

Journal of Chromatography A, 741 (1996) 149–150

JOURNAL OF
CHROMATOGRAPHY A

Book Review

Hyphenated Techniques in Polymer Characterization: Thermal, Spectroscopic and Other Techniques (ACS Symposium Series, No. 581) edited by T. Provder, M.W. Urban and H.G. Barth. American Chemical Society, Washington, DC, 1994, x+189 pp., price US \$54.95, ISBN 0-8417-3057-9.

This work follows from a Symposium held in Chicago, Illinois in August 1993.

The work is principally of interest to polymer chemists who are concerned with polymer characterization. As certain of the chromatographic techniques form part of the hyphenated procedures for polymer characterization, the treatment is relevant to other areas of chromatography. On a broader basis the hyphenated techniques have widened the value of chromatography and provided new areas of considerable activity.

The book consists of twelve chapters, half of these are directly related to the use of the chromatographic techniques, the others are of interest as they demonstrate the applicability of hyphenation.

The preliminary chapter is of interest to chromatographers in general, the rationale of hyphenated techniques in chromatography generally being the same as applied to polymers except that specific techniques are applicable to each application. An overview of the currently available multi-functional techniques used in polymer analysis is presented and those features of hyphenated techniques that are potentially of interest in the future are considered. The synergistic effect of hyphenated techniques, their potential, error analysis and utilization in hyphenated experiments are discussed. The possibility of coupling various analytical and separative techniques are shown in Tables A and B.

Integrated Intelligent Instruments for Material Science forms Chapter 2 and while directed towards the polymer scientist, analytical pyrolysis, dynamic headspace, supercritical fluid applications and chro-

matographic techniques of capillary gas chromatography, supercritical fluid chromatography and spectral detection systems such as Fourier transform infrared spectroscopy and/or mass spectrometry are of interest to many chromatographers.

Chapter 3 is entitled Determination of Polymer Molecular Weight by Flow Injection Analysis and Refractive Index Gradient Detection. While the separations are achieved without chromatographic methods, the procedure is compared to size-exclusion chromatography and capillary zone electrophoresis. The advantages in the elimination of the need to use high-pressure pumps and the presence of overlapping peaks are outlined.

A New Generation of Mass Spectrometers for Characterizing Polymers and Related Materials forms Chapter 5. The chapter focuses on new ionization methods, laser desorption ionization is coupled to time-of-flight mass spectrometry providing accurate molecular masses of 250 000. Modern laser-based mass spectrometers are of particular value in areas where the performance of gel permeation chromatography levels off i.e. $M_r < 10\,000$ or where detailed molecular structures are required. The use of electrospray methods is expected to allow gel permeation chromatography to be directly coupled to Fourier transform mass spectrometry.

Chapter 6 is entitled Polymer Characterization by an Advanced Simultaneous Thermogravimetric–Mass Spectrometric Skimmer Coupling Method. This short chapter combines thermoanalytical methods with quadropole mass spectrometry resulting in a considerable improvement in the information ob-

tained. It would appear that the information produced could be further improved by the use of the techniques indicated in association with chromatographic separation.

Chapter 7 is entitled Polymer and Other Degradation Studies Using Thermal Analysis Techniques, and again concerns hyphenated thermal analysis. As with the preceding chapter further exploitation would seem to have potential.

Decomposition of Ethylene–Vinyl Acetate Copolymers Examined by Combined Thermogravimetry, Gas Chromatography and Infrared forms Chapter 8. The utility of the analysis of ethylene–vinyl acetate polymers after chemical degradation, by trapping of the volatile products in a Tenax trap and desorption into a gas chromatograph and identification by mass spectrometry and Fourier transform infrared is described and the results compared with earlier studies.

The work is of considerable interest to polymer chemists concerned with polymer characterization and to the more general chromatographer interested in the development of chromatography through the application of hyphenated techniques. The use of modern techniques are described and the potential indicated. Half of the references cited appeared within the five year period which preceded the symposium thus indicating the timeliness of the work.

The small work is well recommended as an addition to polymer libraries and as reading to all workers interested in the use and development of hyphenated techniques.

Kensington, Australia

J.K. Haken