

COMPREHENSIVE CHARACTERIZATION OF MACROMOLECULES BY GPC/SEC METHODOLOGIES

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ABSTRACT

Macromolecules play an important role in almost every aspect of our life spanning from proteins to synthetic polymers. The understanding of structure-property-function relationships is crucial for the design of optimized and sustainable use of macromolecules. This requires comprehensive analytical techniques to characterize various properties from molecular to macroscopic scale.

The major advantage of chromatography lies in its ability to separate macromolecules and determine the property distributions, which are key to fine-tuned products and applications. The combination of GPC/SEC as a separation technique with intelligent (multi-) detection like on-line viscometry, light scattering and/or spectroscopic techniques like infrared spectroscopy or mass spectrometry allows for further in-depth investigation of e.g. physical, compositional, structural aspects in each analytical fraction.

This presentation will present an overview of different GPC/SEC methodologies to study macromolecules on the molecular level. Various detection techniques will be described to characterize complex macromolecules with regard to molar mass distribution, chemical composition distribution, molecular architecture distribution, functionality type distribution. The potential and limitations of individual technique will also be compared.

Further reading (review papers):

1. D. Held, P. Kilz, Characterization of Polymers by Liquid Chromatography, *Macromolecular Symposia*, **231**, 145 (2006); DOI 10.1002/masy.200590019
2. P. Kilz, Optimization of GPC/SEC Separations, in: HPLC Made to Measure; S. Kromidas (Ed.), Wiley, Weinheim 2006
3. P. Kilz, Two-Dimensional Chromatography as an Essential Means for Understanding Macromolecular Structure, *Chromatographia* **59**, 3 (2004)
4. P. Kilz, H. Pasch; Coupled LC Techniques in Molecular Characterization; in: Encyclopedia of Analytical Chemistry (R.A.Meyers, ed.), Vol. 9, pp 7595-7543, Wiley, Chichester 2000