
CHARACTERIZATION OF MACROMOLECULES VIA HYPHENATED AND MULTIDIMENSIONAL TECHNOLOGIES

Hernan J. Cortes

Hernan J. Cortes Consulting, LLC. Midland, MI USA 48642, hjcortes1@gmail.com

Macromolecules of synthetic and biological origin require special attention when characterization using separation techniques is needed, since their chromatographic behaviour may or may not be akin to conventional small molecules. Detailed characterization of synthetic polymers is critical for better understanding of structure-performance relationships. Performance properties are dependant on a number of variables, such as molecular weight distribution, molecular topology, functionality and chemical composition.

Because such molecules typically lack volatility, separations in the liquid phase are predominant, although large molecules can be converted to small molecule fragments that can be analyzed in the gas phase after pyrolysis treatment, or other means. However, such sample treatments create mixtures of such complexity that single dimension separations are not sufficient to yield the desired information. The use of multidimensional chromatography and appropriate detection become critical for elucidation of chemical structure as well as understanding the implications of structure on performance, since the higher peak capacities obtained as well as the ability to utilize a variety of orthogonal separation mechanisms, supply information not attainable by other means.

This presentation will outline strategies used in the characterization of large molecules using hyphenation and multidimensional techniques. Examples of the applications to problems of current interest will be presented to highlight the utility of the technologies devised.

References.

- 1.-S. Julka, H. J. Cortes, R. Harfmann, B. Bell, Bruce; A. Schweizer-Theobaldt, M. Pursch, L. Mondello, D. West, S. Maynard *Anal Chem.* 81 (2009) 4271-4279
- 2.-H. J. Cortes, B. Winniford, M. Pursch, J. Luong. *J. Sep. Sci.* 32 (2009) 883-904
- 3.-B. Gu, H, J. Cortes, J. Luong, M. Pursch, P. Eckerle, R. Mustacich. *Anal Chem.* 81 (2009) 1488-1495
- 4.-T. Kajdan, H. J. Cortes, K. Kuppannan, S. Young. *J. Chromatogr. A.* 1189 (2008), 183-195
- 5.-P. Eckerle, M. Pursch, H. J. Cortes, K. Sun, B. Winniford, J. Luong. *J. Sep. Sci.* 31 (2008) 3416-3422