

Unknown GPC peak identification by multimode GPC-MS/MS/DAD

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Abstract

It's quite often that there are small unknown peaks showing up between the polymer peak and the solvent peaks in a GPC or SEC chromatogram. Those small peaks could be polymer oligomers, or polymer additives, or even the residues of the catalyst system. But the common GPC/SEC detectors like RI, Lighter Scattering and Viscometer lack the capability for chemical identification. In many cases, those small peaks are just ignored in molecular weight (MW) and molecular weight distribution (MWD) measurement. The research effort and instrumentation advance to identify those small peaks are far behind those for volatile analysis by GC-MS and polymer additive analysis by LC-MS.

But those small peaks are part of the polymers. If their chemical identification can be determined, it will be sure to help to understand more of the polymer's physicochemical properties, and the polymer "leachables", "extractables", and the "xylene solubles".

This presentation will show how to setup the "hybrid" instrument of a GPC/SEC system with the triple quadrupole mass spectrometer from a readily available LC-MS/MS system, and how to modify the post-column mobile phase to make it suitable to the MS/MS detector.

Our results show the GPC-MS/MS/DAD system is a very powerful tool to identify those small peaks. The MS spectra of different ionization modes, negative and positive, along with the UV spectra will greatly narrow down the candidate list of the small unknown peaks. With some MS interpretation experience and/or standard matching, many of those small peaks can be identified without much difficulty.

Biography

Nasser M Al-Harbi is the Chromatography Technical Leader at SABIC Technology Center at Riyadh (STC-R). He completed his Ph.D. research in the University of Manchester in 2011. He did more research for about two years in the Petrochemical Research Institute at King Abdulaziz City for Science and Technology before he joined SABIC. He has been doing research in Chromatography at STC-R for nine years.

Dr. Al-Harbi also is serving as a Board Member of the Saudi Arabia Chemical Society and the Technology Leader of the QAIF-05 Conference.