GCxGC coupled to Fast Scanning Quadrupole MS for Selected POP Ultra-Trace Analysis

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The 'Quest for the Holy Grail' in the 'dioxin' analysis area is dedicated to the development of procedures that offer congener-specific results on a short time scale. Each part of such a procedure, namely extraction, clean-up, fractionation, chromatographic separation, and physico-chemical measurement, has to be fine tuned to its optimum capabilities. Whatever the measurement method used, the sensitivity has to be at the ppt level. Large sample sizes have thus to be processed and large amounts of matrix-related interferences must be removed prior to measurement.

As an alternative to the complex reference GC-HRMS approach, new methods are explored. Based on our previous investigations on the use of GCxGC-IDTOFMS for the measurement of POPs[1], we currently evaluate the capabilities of GCxGC coupled to fast scanning low resolution qMS. The qMS can scan at up to 20Hz in the selected mass range. This is allows isotope dilution quantification under good QA/QC criteria. GCxGC-qMS data show good correlation with reference GC-HRMS data. Additionally to the routinely used EI for PCBs and dioxins, NCI is available on this instrument. Although NCI has been known to be subject to reproducibility problems from the past, recent improvements in NCI hardware make NCI a potential alternative to EI for GCxGC. Very good sensitivity can be expected for such a coupling. This can motivate the use of NCI despite the reduced information on fragmentation and the reduced flexibility in terms of quantification procedures. Preliminary data on the development of an NCI-GCxGC-qMS method for dioxins will be presented.

1. J.-F. Focant, A. Sjödin, D.G. Patterson Jr., The Encyclopedia of Mass Spectrometry, Hyphenated Methods. In: Niessen, W.M.A. (Eds.). Elsevier, Amsterdam, The Netherlands, pp 553, 2006.