

RECENT ADVANCES IN THE MS MEASUREMENT OF DIOXINS AND OTHER POPS

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Are dioxin analyses still of concern in 2015? Aren't we at analytical standstill? Don't we waste time and money chasing out old toxicants? Are we still exposed to unacceptable levels of dioxins? Does it make sense to develop analytical methods with LOQs at the femto to attogram level? Are we self-comforting ourselves by just looking to the tip of the iceberg? Are there other needles in the hay stack? Should the EU legislation MRLs be driven by analytical method capabilities or should analytical chemists develop methods based on what the legislation needs? These questions often pop up in the area of dioxin measurements, or more globally, in the area of ultra-trace measurements of persistent organic pollutants (POPs) in food and feed. For these reasons, the scene has changed and the science that plays in it has to adapt [1,2].

A fact is that we are still exposed to these compounds and that one has to ensure this exposure is limited to acceptable levels. Current analytical methods should therefore be able to measure target levels (dioxins, PCBs, OCPs, ...) of interest, but also open the door to larger screening of 'known unknowns' such as flame retardants (FRs). In that context, significant advances have been attained in the area of target analyses. This includes extreme sensitivity enhancement of 'classical' GC-sectorHRMS instruments using cryogenic zone compression (CZC) [3]. It also relies on the use of MS/MS approaches based on electron ionization (EI) triple quadrupole MS analyzers (QQQs) [4], but also atmospheric pressure ionization GC (APGC) [5]. These later approaches both demonstrated their capability in terms of food and feed control. Ion mobility (IM) is also studied for enhanced separation of dioxin congeners.

For larger screening, one still needs more peak capacity and comprehensive two-dimensional GC (GCxGC) is then the tool of choice. This is even more true when coupled to HRTOFMS for accurate mass measurements. Such screening allows to highlight possible analytes of interest, as it is the case for Dechloranes. Despite the fact that they are only produced in North America and Japan, Dechloranes have recently been found at levels higher than PBDEs (ng/g lipids) in serum collected in Western Europe [6]. Efforts should therefore be made to better understand their behavior and possible human toxicity as they might become the next family of FRs to consider for human biomonitoring but also food control as Dechloranes are found in European food [7]. Comprehensive sample preparation methods, allowing the isolation of dioxins, PCBs, OCPs, PBDEs, and Dechloranes are currently under development to enlarge our global number of analytes to be measured per single sample.

This presentation will highlight these various aspects of recent advances of MS in the area of POPs.

References:

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