A TOTAL SOLUTION FOR THE FAST MEASUREMENT OF ULTRA-TRACE LEVELS OF DIOXINS AND PCBs IN FOOD USING AUTOMATED HYPHENATED TECHNIQUES

Focant J.-F.[1], Shirkhan H.[2]

[1]CART, Organic and Biological Analytical Chemistry, Mass Spectrometry Laboratory, Chemistry Department, University of Liège, Allée de la Chimie 3, B-6c Sart-Tilman, B-4000 Liège, Belgium.(JF.Focant@ulg.ac.be)
[3]Fluid Management Systems, Inc., 56-58 Felton Street, Waltham, MA, 02452, USA. (hshirkhan@fms-inc.com)

Abstract

Monitoring the quality of our foodstuffs includes screening for known toxicants to ensure they are not present or present below regulatory values. Among the Persistent Organic Pollutant (POP) group, dioxins (polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs)) and polychlorinated biphenyls (PCBs) have to be monitored. Preparing food samples for dioxin and PCB measurement is a task that is challenging many research centres and routine laboratories. The implementation of proper procedures requires time, extensive know-how, and money. Accredited laboratories often require a week or more for reporting, due to the tedious manual multi-step procedures that are mandatory for this ultra-trace analysis (ppt, ppq). In the past few years, efforts have been focused on the development of alternative procedures to speed up and simplify the process, while maintaining high QA/QC level.

As a result, an integrated procedure has recently been proposed. It rests on the use of pressurized liquid extraction (PLE) coupled to an automated solvent reduction device that produce sample extracts that can automatically be further cleaned-up via a multi-step liquid chromatography (LC) setup. In addition to the sample clean-up, the LC setup allows fractionation of extracts into analyte groups that are further automatically concentrated to satisfy to final large volume injection (LVI) gas chromatography-mass spectrometry (GC-MS) analysis. Batches of samples (n=6) can be processed in parallel so that same-day testing can now be performed for series of samples.

The development of such a fast ‘cook book’ procedure has large interest in the food processing industry where testing has to be performed as quickly as possible to avoid down time in production lines. The level of automation and coupling is such that it is now possible to perform the dioxin screening on site in a regular industrial laboratory to avoid sub-contracting of the analysis to a highly skilled specific laboratory.