

Analysis of POPs in 20 μ L blood by MEPS-GC-MS/MS

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Humans all over the world are exposed to chemicals during their life time. Among the thousands of existing anthropogenic compounds are the persistent organic pollutants (POPs), including compounds like polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), but also a large number of new molecules like halogenated flame retardants (HFRs). Nowadays, POP (temporal) human biomonitoring is classically performed on serum specimen. Typically, 5-75 mL of whole blood are sampled from patients and analyzed by state-of-the-art GC isotope dilution (ID) sector HRMS. Even if much less invasive than the classical surgical abdominal fat removals that were performed in the 1980's, the venipuncture of several milliliters of whole blood for analytical purpose is still badly perceived by patients.

The aim of the work is to develop and miniaturize an analytical strategy for the analysis of representative POPs in small sample volumes. Samples consist in 20 μ L liquid whole blood and ultimately dried-blood spots. This sample method can be considered as non-invasive since a few drops of blood are collected on a filter paper.

The strategy is based on a micro-scale sample preparation: micro-extraction by packed sorbent (MEPS). The instrumental analysis is performed on an Agilent 7000 GC-QQQ.

The extraction procedure was partially automated using MEPS syringes and provided clean extracts that didn't require further clean up. The miniaturization was pushed to its limits since the total amount of solvent used was as low as 500 μ L. The GC triple quadrupole analyzer has shown limits of detection for targets in the same order than the very sensitive GC-HRMS instrumentation making possible analyzes of trace level compounds in small samples.