

Time-Compressed Analysis of Polychlorinated Biphenyls in Biological Samples by Gas Chromatography/Time-of-Flight Mass Spectrometry.

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Abstract

Polychlorinated biphenyls (PCBs) are a class of Persistent Organic Pollutants (POPs) that are important environmental toxicants. These compounds are ubiquitous in the environment and various levels of human exposure (acute as well as chronic) have been well documented. Out of the 209 possible congeners, 38 congeners (all of which have at least one chlorine atom in the *ortho* position) are utilized as biomarkers in human blood. In order to evaluate their concentration levels in humans, robust analytical methods are required. These methods must be sensitive enough to allow part-per-trillion (ppt) level detection and fast enough for high sample throughput. A new, fast gas chromatography/isotope dilution/time-of-flight mass spectrometry (GC/IDTOF MS) method has been developed to enhance the capabilities of the current GC/IDHRMS method in use. The high data acquisition rate and powerful peak deconvolution software provided on the TOF MS allowed for time compression of the analytical run from 22 minutes (in the GC/IDHRMS method) to 5.6 minutes. Standard calibration curves have also been produced and quality control samples have been analyzed. Overall, this method has the potential to improve sample throughput to 100 samples a day for a single GC/TOF instrument, with detection limits in the low ppt range and can easily be extended to 13 persistent pesticides, as illustrated.

