EU Compliant Routine Quantitative Dioxin, Dioxin-like PCB and Marker PCB Analysis by GC-MS/MS Using an Advanced Electron Ionization Source

**Abstract**
In this study, the performance of a triple quadrupole GC-MS/MS system equipped with an advanced electron ionization (EI) source was evaluated. Data were acquired on two different Thermo Scientific™ TSQ™ Vantage™ AXI system located in two different laboratories and operated by different chemists (UK and USA). Commercially available solvent standards, food fleet, and proficiency test (PT) sample were used to evaluate the performance of the system for the analysis of polychlorinated dibenzo-p-dioxins (PCDD), polychlorinated dibenzofurans (PCDF), polychlorinated biphenyls (PCBs), and other dioxin-like compounds. The study aimed to determine the regulatory changes in EU in 2014, sensitivity has often been the primary concern when demonstrating GC-MS/MS performance for contract and regulatory compliance, confirming the presence of dioxin and dioxin-like compounds.

**Materials and Methods**
Sample preparation
Food and feed samples (including PT samples) were provided by the EU for high-quality analysis and feed. Each sample intake weight of 2 grams (fat) was used for the samples unless otherwise indicated. For sample preparation, and quality assurance, a high-resolution gas chromatography system with absolute isotope ratio mass spectrometry (GC-IRMS) and a high-precision LECO isotope ratio mass spectrometer (LCTech™ Platinum System) was used. The extracts were prepared with fatty acids, free and bound to the matrix for the GC-MS/MS analysis. The results were analyzed using Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS) software, version 7.2, which allows instrument control, quantitative analysis, and customization.

**Results**
The independence phase of the EU Compliant Quality Control column (PFAD) provided excellent separation of PCDD/F and PCB congeners, particularly the lower molecular weight congeners. The use of a large-ion chromatographic system was also effective in achieving high-resolution separation of congeners, allowing for the accurate quantification of the lower molecular weight congeners.

**Discussion**
Overlaid chromatograms (Figure 7) showed that the differences in the peak areas between the lower Molecular Weight (MW) congeners were not only due to the lower precision of the lower MW congeners but also due to the lower resolution of the lower MW congeners. The differences in the peak areas between the lower MW congeners were not only due to the lower precision of the lower MW congeners but also due to the lower resolution of the lower MW congeners. The differences in the peak areas between the lower MW congeners were not only due to the lower precision of the lower MW congeners but also due to the lower resolution of the lower MW congeners. The differences in the peak areas between the lower MW congeners were not only due to the lower precision of the lower MW congeners but also due to the lower resolution of the lower MW congeners. 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