Sample Preparation And GC×GC : Fundamental Alleys To Unravel MOSH And MOAH Contamination

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Food analysis is swiftly evolving, embracing advanced analytical techniques to tackle increasingly complex inquiries. In the realm of analytical chemistry, two overarching trends are discernible. On one front, sample preparation methodologies are gravitating towards more efficient, compact, and potentially solvent-free approaches. Conversely, in instrumental development, there's a preference for robust techniques to maximize data yield per analysis. Achieving this objective necessitates enhancements in both chromatographic separation and detector systems. In this context, the introduction of comprehensive 2D GC (GC×GC) by Phillips in 1991 stands out as a remarkably versatile and promising technique for food analysis. Presently, GC×GC has matured into a robust technique, although still facing resistance for its applicability for routine food quality, authenticity, and safety assessments. Its strengths lie in its capacity for simultaneous targeted and untargeted sample profiling, yet the synergistic role of sample preparation with GC×GC is often underappreciated. Effective sample preparation can significantly enhance GC×GC performance, thereby unlocking richer data insights. In exchange, the enhanced resolution achieved through GC×GC can simplify the sample preparation process, minimizing manipulation, solvent consumption, and time.

In this presentation, we will delve into the mutually beneficial relationship between GC×GC and sample preparation methods, particularly in the field of mineral oil hydrocarbon (MOH) contamination in food. The development and validation of a fully integrated LC-GC×GC-TOFMS/FID system [1] is discussed, as well as the ratio during the LC purification and before the chromatographic process to significantly improve the reliability of the data generated and mitigate the uncertainties in the analytical workflow. Particular focus is given to the optimization of an alternative chromatographic purification to the time-consuming, less reliable, and error-prone epoxidation procedure used for MOAH purification. Notably, it achieves a much lower quantification bias, around 5%, compared to over 40% with epoxidation. At the same time the improvement of the routine the extraction of MOH from edible oil through the employment of a microwave-assisted saponification method and a more suitable selection of the solvent mixture used for the saponification is discussed in light of the reduction of the overall uncertainty [2].

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