

Development of an extraction step in an existing sample preparation method for analyzing pesticides in eggs via GC-MS/MS and LC-MS/MS

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The methods for the analysis of pesticides in foods of animal origin are confronted with a number of challenges mainly caused by the complexity of the matrices concerned, rendering them time consuming and laborious. Furthermore, these methods are associated with high expenditures concerning the equipment. The already existing “quick and easy” approaches are often limited in terms of clean-up efficiency. Recently, Hildmann et al. [¹] proposed a new methodology for pesticide residues in chicken eggs. In contrast to the established methods, this enables the simultaneous analysis of GC- and LC-amenable compounds while achieving the highly effective removal of matrix components. Despite several advantages compared to the currently established EN 1528 method, the approach developed for extraction based on matrix solid phase dispersion (MSPD) still requires considerable time and manual work.

As recently demonstrated by Rasche et al. [²], an Ultra-Turrax Tube Drive System can be used alternatively to effectively extract a broad spectrum of pesticides from dried fruits and fatty cereals. The IKA-System with exchangeable polypropylene vessels, including a stator-rotor-system and a driving station, offers the possibility of simultaneous homogenization and liquid-liquid extraction (LLE) as a “one-pot solution”. The objective of this study was to apply this method to the analysis of pesticides in foods of animal origin.

Compared to the MSPD, the Ultra-Turrax Tube Drive proved to be less time-consuming while maintaining excellent extraction and clean-up efficiency as it offers flexibility for controlling the extraction conditions particularly in terms of pH and water activity. This paves the way towards a flexible adaptation of the method parameters to the requirements determined by the chemical characteristics of the analytes and the particularities of the food matrix. Ultimately, it could be demonstrated that strongly acidic phenoxycarboxylic acids, benzoic acid derivatives, and benzonitriles are captured when the pH is decreased during the extraction step.

[¹] Hildmann, Gottert, Frenzel, Kempe, Speer: Pesticide residues in chicken eggs – A sample preparation methodology for analysis by gas and liquid chromatography/tandem mass spectrometry, *Journal of Chromatography A* Volume 1403, 17 July 2015, Pages 1–20

[²] Rasche, Fournes, Dirks, Speer: Multi-residue pesticide analysis (gas chromatography–tandem mass spectrometry detection) - Improvement of the quick, easy, cheap, effective, rugged, and safe method for dried fruits and fat-rich cereals - Benefit and limit of a standardized apple purée calibration (screening), *Journal of Chromatography A* Volume 1403, 17 July 2015, Pages 21–31