HYPHENATED TECHNIQUES IN FOOD ANALYSIS

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Food products are very complex mixtures that contain many nutrients of organic and inorganic nature. In addition to natural constituents, they may contain xenobiotic substances that come mainly from technological processes, agrochemical treatments or packaging materials. Analytical methods allow the qualitative and quantitative determination of the main components of food samples but can also be selective and sensitive enough to permit the determination of minor components. The analysis of food products may be directed to the assessment of food quality and authenticity, the control of a technological process, the determination of nutritional values and the detection of molecules with a possible beneficial or a toxic effect on human health. Consequently, a major objective in food chemistry concerns the continuous improvement and development of analytical techniques.

Monodimensional chromatographic processes are widely applied in the analysis of food products. Although such methods often provide rewarding analytical results, the complexity of many naturally occurring matrices exceeds the capacity of any single separation system. As a consequence, in the past years considerable research has been dedicated to the combination of independent techniques with the aim of strengthening resolving power. A possible solution may be to direct the column effluent to the ion source of a mass spectrometer. Although the potential of MS detection is enormous, interpretation of MS data is easier and more reliable when high-quality mass spectra are obtained for completely resolved compounds.

Resolving power may be boosted greatly by employing a multidimensional (MD) chromatographic system, which essentially combines two independent separation steps. Conventional MD chromatography includes a series of a heart-cutting methods, which enable the re-injection of a certain number of multi-compound effluent fractions from a primary column to a secondary column, connected by a dedicated transfer system. If the entire sample requires a comprehensive separation on two dimensions, then a different route must be taken. Specific interfaces and requirements for first and second dimension columns and experimental conditions must be followed.

In this presentation an overview of the results obtained in the field of food chemistry using multidimensional chromatographic techniques will be presented, both in terms of method development and applications with an emphasis on Comprehensive Chromatography coupled to Mass Spectrometry.