Ultra-sensitive Gas Chromatographic Analysis of PAHs with a Temperature-controlled APLI-source

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Methods

Experimental Setup

Atmospheric pressure laser ionization (APLI) is coupled to a mass spectrometer in a very selective and particularly ultra-sensitive method to ionize and analyze PAH compounds or gas chromatography (GC-APLI) [6]. It has the advantage that non-alkaline analytes become efficiently ionized after derivatization with an APLI matrix, i.e., an efficiently ionizable PAH group[4].

Our enhanced home-built multi purpose ion source (MPIS) gives the opportunity to switch swiftly between GC and LC coupling stages to the same MS equipped with various ionization methods including APLI, APCI, and APPI.

Dry gas and MS inlet design impact

The use of dry gas in liquid chromatography (LC-MS) is required to prevent membrane drying or dry gas flow is increased until the first vacuum stage of the mass spectrometer. The impact of dry gas and other critical parameters (e.g., ionizing gas parameters, geometrical arrangement) of the mass spectrometer inlet design is discussed in Figure 7 for a 5-spokes ion source (MPIS geometry) [7].

Conclusions

A temperature-controlled atmospheric pressure ion source is essential for stable analytical performance for LC analysis with high water content eluents or high eluent flow rates. The temperature elevation of a LC-MS prevents condensation of water and can be used for both low and high pressure gas chromatography and gas chromatography.

The sensitivity of GC-APLI is significantly decreased by application of a dry gas flow and the MS end cap but cap arrangement, however, the effect is less critical when the ion source is completely covered (figure 5).

The GC-APLI-MS is a powerful tool to analyze PAH mixtures with an ultra-sensitive detection and allows a large variety of ionization techniques for environmental analysis.

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References