Beyond GC/ICP-MS: New tools for elemental speciation of volatiles

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The identification of volatile elementorganic compounds is presently performed either by elementspecific or moleculespecific detectors. However, the combination of these complementary detection techniques is most promising.

The presented work proves the technical feasibility of parallel EI-MS and ICP-MS detection after gaschromatographic separation by hyphenation of the respective instruments and shows the conceptual and constructional realisation of this scheme (1).

Synchronized acquisition of both elementspecific and moleculespecific data enables highly sensitive elementspecific quantification and monitoring of moleculespecific data for qualitative verification at the same time. Moreover, the interpretation of complex EI-MS spectra is simplified because the correlation of element information with the signal at a certain retention time facilitates the discovery of chromatographic peaks.

Selected studies demonstrate the applicability of this new analytical tool for various tasks in trace element speciation as low detection limits and high linearity - the benefits of ICP-MS technology – are sustained.

Furthermore, first results will be presented using sector field HR-ICP-MS for detection of GC separated volatiles. Such a system offers outstanding sensitivity for ultra trace speciation in low resolution mode (e.g for environmental monitoring of mercury species) and highly elementspecific detection nearly free from isobaric interferences in medium and high resolution mode (e.g. for speciation of sulphur in beverages or fuel).

The benefits of the presented approaches for elemental speciation of volatile analytes in terms of quality assurance are highlighted:
Misinterpretation of chromatographic data can be avoided and the reliability of results (e.g. identification of unknown species) is improved.

(1)   J. Kösters, J. Hippler, R.A. Diaz-Bone, A.V. Hirner, *J. Anal. At. Spectrom.*, 20 (2005) 996-999.