

The Power of Chromatography for Isotope Ratio MS: Getting More from Less

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Gas chromatography is a widely-used analytical technique with a great perspective of dramatically reducing both analysis time and the amount of material required for stable isotope analysis. The high efficiency of analytical improvements which were recently conducted on the Thermo Scientific™ EA IsoLink™ and Thermo Scientific™ GC IsoLink II™ IRMS Systems demonstrates how chromatography based innovative features push research boundaries at new levels, broadening the available analytical window for small concentrations in bulk samples and biomarker analysis.

This presentation will focus on how continuous flow IRMS utilizes chromatographic principles to routinely increase the sensitivity. NCS measurements by EA-IRMS can greatly benefit maximizing sensitivity and reducing cost per analysis. Especially, the data illustrates the analysis of nitrogen, carbon and sulphur concentrations of less than 5 µg and on very high C/N and C/S ratio samples whilst delivering automated routine analysis. An example of the gains in sulphur sensitivity from measurements on 1 mg of bone collagen demonstrates that data precision is significantly better than 0.3‰.

Furthermore, we report on how the chromatographic system for GC-IRMS can be optimized enabling high-precision isotopic analysis of picomoles of carbon in organic biomarkers. The narrow-bore capillary GC improves the resolving power and low volumetric flow rates increases the efficiency of sample transfer to the ion source, ultimately resulting in reducing sample size requirements for compound-specific carbon isotopic analysis by about two orders of magnitude.

