Improvements in irm-GC/MS Technology

A. Hilkert, D. Juchelka, M. Krummen, J.B. Schwieters

Thermo Fisher Scientific (Bremen) GmbH, Germany

About 30 years ago D. E. Matthews and J.M. Hayes introduced compound specific isotope analysis (CSIA) by isotope ratio monitoring GC/MS (irm-GC/MS). At the beginning the challenge was the development of a suitable reaction interface that provides quantitative conversion of compounds while maintaining chromatographic integrity. Today continuous flow techniques can be found in all fields of application with improved performance on sample size, throughput, multiple isotope methods, overall precision and ease of use. Multi-element and multi-component analyses are performed to deduce unambiguous isotope fingerprints on 13C, 15N, 18O and 2H. The growing interest and appreciation in CSIA requires new features and functionalities of the instrumentation. A new concept for an automated multi-element irm-GC/MS will be discussed. It includes automated switching between the combustion reactor and the high temperature conversion reactor. The combustion mode has been redesigned to determine C and N isotope ratios using identical reactor conditions. The concept incorporates the ConFlo IV as a universal interface to the IRMS. All ConFlo IV capabilities are available for irm-GC/MS, e.g. injection of up to five reference gases, reference gas dilution and automatic H3+ factor determination. The principle of the devices will be discussed with respect to dynamic range, precision, accuracy and sample size. Examples for multi-element and multi-component isotope analysis will be shown.