P14

INCREASED RESOLUTION THROUGHT THE USE OF COMPREHENCIVE TWO DEMENTIONAL GC AND TIME OF FLIGHT MASS SPECTROMETERY IN A GASOLINE MATRIX

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The increase in resolving power obtained from comprehensive two-dimensional GC (GCxGC) made petroleum products one of the main applications for this technique. In addition to the high complexity of the samples, all the analytes present are of interest and cannot be treated as interfering components. This sample characteristic makes mass spectrometry an attractive technique for detection. The very narrow chromatographic peaks obtained from the second dimension of a GCxGC system require fast acquisition rates for adequate peak characterization, precluding most other mass spectrometric techniques from being used for detection. With the high acquisition rate capabilities of up to 500 spectra/s, time-of-flight (TOF) MS becomes the most viable mass detector that can be coupled with the GCxGC technique. In addition to data collection speed, spectral continuity across the chromatographic peak profile enables peak deconvolution for the cases where the achieved peak separation proves not to be sufficient.

Increased environmental concerns in the past decade lead to more stringent control of some of the toxic and ozone forming compounds present in gasoline. Benzene, toluene, ethylbenzene, xylenes (BTEX), and other EPA regulated aromatics are components that are either naturally present or/and added to gasoline in order to increase the octane number. The highly organized chemical class pattern obtained from GCXGC analysis enables easier qualitative and quantitative analysis of these components, but the large amount of information obtained makes manual processing a very difficult task. This study presents the results obtained for the quantitative analysis of BTEX and total aromatics in gasoline using a completely automated GCxGC TOF MS system. Over 20 components are calibrated using 4 internal standards in about 10 minutes. The calibration curves obtained are then used for the quantitative analysis of a reference gasoline material.