

A NOVEL MEMBRANE INTRODUCTION MASS SPECTROMETRY SYSTEM COMBINED WITH FAST GAS CHROMATOGRAPHY

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Membrane introduction mass spectrometry (MIMS) is a sensitive method for on-line analysis of volatiles in aqueous samples. However, excess moisture from feed samples entering the mass spectrometer limits the instrument operation as well as the enrichment of VOC's in the permeate stream. Furthermore, since several VOC's may enter the mass spectrometer at the same time, complex spectra may result. Hence, the new approach has been to use a double membrane arrangement comprising a hydrophobic and hydrophilic membrane in series followed by a (fast) multicapillary column for chromatographic separation prior to ionization and analysis by mass spectrometry.

The dual membrane arrangement consists of a hollow fibre polydimethylsiloxane membrane (hydrophobic, i.d.= 0.90mm, o.d.= 1.30mm, L= 100mm) where enriched organics transfer to a helium carrier gas followed by a hollow fibre Nafion membrane (hydrophilic, i.d.= 0.84mm, o.d.= 1.07mm, L= 400mm) where excess moisture is removed from the permeate stream by vacuum. This system is connected to a jet separator and a quadrupole mass spectrometer. The jet separator discriminates against water and provides additional enrichment, with overall enrichments in the range 103-104. Sampling valves allow for flexible combinations of MIMS (extraction-drying modes), MIMS/Fast GC or Fast GC/MS depending on the application required.

Preliminary results showed that using MIMS on static extraction mode with subsequent transfer to the multicapillary column, a multicomponent mixture of VOC's over a wide volatility range was continuously sampled and separated in a 6 minute cycle. The latest results obtained on the modular system will be presented and its combination with orthogonal acceleration TOFMS (currently in progress) will be discussed with respect to the targeted application of on-line selective analysis of VOC's in environmental and industrial samples.

Fig. 1

