Applications of Membrane Inlet Mass Spectrometry for Long Term Monitoring in the Field

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Membrane inlet mass spectrometry is a well established technique for the analysis of gases and volatile organic compounds in air and water samples [1]. However, despite the methods simplicity and on-line monitoring facility it has primarily been used in laboratories for sample analysis and/or monitoring of chemical and biological reactions. Only very few examples of long term (days), on-site applications have been published in peer-reviewed journals. The first example of such an application dates back to the mid eighties, where Harland and Nicholson [2] installed MIMS systems at various rivers with the intension of monitoring and characterizing chemicals in estuarine waters. A few extra applications have been published in the mean time with the design of an underwater MIMS system [3] as the most recent example.

The lack of peer-reviewed publications where MIMS have been applied for long term, on-site monitoring in the field does not necessarily mean, that the method has serious inherent difficulties. It could also be a simple reflection of a move of the technique out of public research laboratories and into industry, where this type of publication is less common. In this talk we will present data from several Scandinavian examples of such industrial applications of the technique. The applications will cover: (a) On-line monitoring of selected tar components in the “clean” gas from power stations using biological materials as fuel, (b) On-line monitoring of solvents in drinking water supplies to major Danish cities, (c) On-line monitoring of off-odours inside pig farms and (d) On-line monitoring of the production of halo-carbons during disinfection of swimming pools. In addition to the on-line examples a mass spectrometric system intended for the analysis of gases in high pressure ground water samples collected at up to 750 m depths in solid rock will be presented.

[1] Ketola RA, Kotiaho T, Cisper ME, Allen TM. Environmental applications of membrane introduction mass spectrometry. J. Mass Spectrom. 37 (5): 457-476, 2002.

[2] Harland BJ, Nicholson PJ. Continuous measurement of volatile organic chemicals in natural waters. The Science of the Total Environment. 135: 37-64, 1993.

[3] Kibelka GPG, Short RT, Toler SK, Edkins JE, Byrne RH. Field-deployed underwater mass spectrometers for investigations of transient chemical systems. Talanta 64 (4): 961-969, 2004.