

The Development of Condensed-Phase Membrane Introduction Mass Spectrometry (CP-MIMS) for the Direct Online Analysis of Polar, Low Volatility Analytes from Complex Matrices

Student of Note

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Condensed-phase membrane introduction mass spectrometry (CP-MIMS) uses a semi-permeable membrane to separate an aqueous sample from a liquid acceptor phase (e.g. organic solvent). The membrane precludes the bulk of the sample, allowing analytes of interest to diffuse across and be directed to an ambient ionization source (e.g. ESI). Having a condensed acceptor phase allows the analysis of semi-volatile/non-volatile and/or polar compounds, those not amenable to 'conventional' gaseous acceptor phase MIMS. Our group has been exploring the development of this technique, finding it suitable for the direct, continuous, on-line, trace level monitoring of a wide range of environmental contaminants and bio-analytes. Presented work was carried out using 10cm lengths of polydimethylsiloxane (PDMS) or Nafion[®] hollow fibre membranes with a methanolic acceptor phase directed to an ESI-MS/MS system. Detection limits and signal response times have been determined for a wide range of analytes encompassing environmental contaminants, pesticides and pharmaceuticals in a number of complicated sample matrices, including undiluted artificial urine. The recent development of portable mass spectrometers with ambient ionization sources will facilitate future applications of CP-MIMS for the real time, online measurement of trace polar, low volatility analytes directly in the field.