HPR-40 DSA

Membrane Inlet Mass Spectrometers for Dissolved Species Analysis
Membrane Inlet Mass Spectrometry (MIMS) enables analyses of dissolved gases and volatile compounds from bulk samples.

**Applications:**
- Water analysis in Estuary, River or Reservoir (Denitrification)
- Soil core analysis
- Fermentation process analysis
- Groundwater contamination studies
- Methane production control
- Microbiological/Enzyme activity studies
- Environmental monitoring
- Electrochemical Analysis (DEMS)
Example Data

PPT Level Detection of Volatiles in Water

The HPR-40 DSA was used to detect trace amounts of CH$_3$SCH$_3$ (Dimethylsulfide, DMS) in ocean water. DMS is a naturally occurring substance produced from micro-organisms and related to global climate change and regulation. The amounts which were detected in this application go down to 60 ppt (parts per trillion), which corresponds to dilute concentrations of DMS of less than 1 nML$^{-1}$.

The diagrams show the calibration curve and raw data obtained from DMS solutions in different concentrations.

Denitrification Studies

The HPR-40 DSA was used to investigate denitrification by Pseudomonas stutzeri in a static lakewater column. Continuous real-time measurement of gases enabled the dynamics of the process to be investigated. Concentrations of 17 mmol/L nitrate and 10 mmol/L nitrite were identified as optimal for denitrification under nutrient-limited conditions (i.e., produced the highest concentrations of N$_2$). Available carbon was the major rate-limiting factor in lakewater when nitrate or nitrite was present. No stratification of the process with depth was observed, and aerobic denitrification was apparent under all the conditions employed.

Denitrification by Pseudomonas stutzeri in a sterile lake water microcosm supplemented with succinate and nitrate.

Mass ranges, amu: 1-200 / 1-300 amu
Sensitivity: 100% to 60 ppt (species dependent) subject to spectral interference
Speed: Up to 650 measurements/second
Software: MASsoft Professional
Windows 7/8/10 compatible
Interface: Ethernet/USB/Serial (RS-232) connections
Detector: Dual Faraday/Channeltron Electron Multiplier
Analogue input: 8x (optional)/16 bit
Analogue output: 8x (optional)/14 bit
Digital input: 8x
Digital output: 8x, 24 V
Further system options: Application specific inlets
Multi-stream sampling
Dimensions (L x W x H), mm: 494 x 535 x 624 mm
Weight, kg: Typically 44 kg (Including external membrane backing pump)
Power requirement: 110/220/240 V AC, 50/60 Hz, 1.2 kVA
Inlet options

**FLOW-THROUGH PROBE**
The Flow-through Probe is directly mounted on the MS with two ports to allow flow from an external reservoir. It is used for a wide range of dynamic applications.

**CUVETTE CELL**
The Cuvette Cell is designed to allow temperature control and illumination of a liquid sample – e.g. for algae studies.

**ENZYME KINETICS PROBE**
The Enzyme Kinetics Probe was specifically developed to be submerged in enzyme containing samples. All wetted parts are made of glass to avoid sample contamination and side reactions.

**TYPE A DEMS CELL**
The Type A DEMS Cell supplies a membrane inlet in close vicinity to an electrode for flexible analyses of electro-chemical reactions or catalysts.

**TYPE B DEMS CELL**
The Type B DEMS Cell is designed for optimum performance in analysis of electro-chemical reaction products.

**PROBE INLET**
The Probe Inlet is a membrane inlet that can be submerged in any liquid or slurry sample. It is used for a wide range of applications.

*For more info on DEMS please see DEMS brochure.*
Hiden APPLICATIONS

Hiden’s quadrupole mass spectrometer systems address a broad application range in:

GAS ANALYSIS
- dynamic measurement of reaction gas streams
- catalysis and thermal analysis
- molecular beam studies
- dissolved species probes
- fermentation, environmental and ecological studies

SURFACE ANALYSIS
- UHV TPD
- SIMS
- end point detection in ion beam etch
- elemental imaging – 3D mapping

PLASMA DIAGNOSTICS
- plasma source characterisation
- etch and deposition process reaction kinetic studies
- analysis of neutral and radical species

VACUUM ANALYSIS
- partial pressure measurement and control of process gases
- reactive sputter process control
- vacuum diagnostics
- vacuum coating process monitoring

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