

Real-Time Ambient Air Monitoring Campaigns Using Syft SIFT-MS

Key Benefits

Analytical results in seconds

Detection limits in the pptv range

Direct air analysis without preconcentration or drying

Readily deployed to site and robust

Remote operation

Easy to use



The sensitivity, selectivity and real-time analysis offered by the Syft Technologies' Voice200 *ultra* SIFT-MS solution provides simple, reliable and continuous analysis of trace volatile organic compounds in ambient air.

Volatile organic compounds (VOCs) are typically found in air in the part-per-trillion and part-per-billion by volume (pptv and ppbv) concentration range. Since both anthropogenic and biogenic sources of VOCs display significant time dependence, traditional GC/MS methodologies are unsuitable, due to preconcentration requirements and slow analysis times.

Alternatively, Selected Ion Flow Tube Mass Spectrometry (SIFT-MS) detects and quantifies VOCs in real-time in air to pptv levels with no sample preparation. This application note illustrates how readily a Syft Technologies' Voice200 SIFT-MS instrument can be deployed for a short-term campaign to provide detailed, real-time VOC analysis.

A Syft Voice200 instrument was deployed at Shu-Lin Primary School in Taoyuan County, near Taipei, Taiwan R.O.C. from 19 to 21 July 2011. The school is situated adjacent to an industrial area. Concentration data were obtained for 48 compounds, many of which had been previously identified at the site using GC/MS. Results are shown in Figures 1 and 2 for several compounds

that exhibited interesting trends, including toluene, methanol, isopropyl alcohol, acetone and N,N-dimethylformamide. Concentrations ranged from sub-ppbv to peak levels for methanol of ~250 ppbv.

Elevated concentrations indicate periods when pollutants were released from a stack. Instantaneous variations arise from gusty wind conditions at the coastal site. The use of multiple reagent ions per compound confirms that changes are real and provides enhanced selectivity compared to other real-time techniques (reagent ions are switched in less than 10 ms in the Voice200). Figure 2 shows the close agreement obtained from independent measurements of N,N-dimethylformamide using the H_3O^+ and NO^+ reagent ions with their $m/z = 74$ and 72 product ions, respectively.

The high-speed analysis provided by SIFT-MS makes it ideally suited to continuous monitoring of ambient VOCs. The Syft Voice200 SIFT-MS solution provides a robust, easily deployed and operated package for sensitive, quantitative real-time monitoring of a diverse range of VOCs and inorganic gases.

Experimental Method

Sample	Ambient air ¹
Accessories	5 meters of 1/4" o.d. Teflon tubing ²

1. Air drawn directly by instrument
2. Residence time of ~3 minutes.

SIFT-MS Analysis

Instrument	Voice200®
Inlet type	High performance
Sample flow	25 sccm
Software	Voice200 & LabSyft
Analysis type	Full scan; m/z 10 – 200
Reagent ions	H ₃ O ⁺ , NO ⁺ , O ₂ ⁺

Compounds¹ 48 in total, including aromatic and aliphatic hydrocarbons, aldehydes, ketones, halocarbons, alcohols, esters, acrylates and various nitrogen- and sulfur-containing compounds

Dwell time per mass	500 ms per measurement cycle
Data time resolution	5 minutes
Typical LOD ²	0.5 pptv

1. Full scan data were rapidly processed using the LabSyft software to give concentrations.
2. Per data point; LODs are improved using a SIM approach

Further Reading

Syft Whitepaper *SIFT-MS: A Significant New Tool for Real-Time Air Quality Monitoring*

Syft Brochure *LabSyft: Laboratory Software for SIFT-MS Applications*

Syft Brochure *Real Solutions*

Syft Brochure *Mobile Analysis of VOCs Made Simple*

B.J. Prince, D.B. Milligan, M.J. McEwan (2010), *Application of [SIFT-MS] to real-time atmospheric monitoring* Rapid Commun. Mass Spectrom. 24, 1763.

D. Smith, P. Spanel (2005). *[SIFT-MS] for on-line trace gas analysis*, Mass Spec. Rev, 24, 661-700.

Figure 1. Temporal concentrations of aromatic and oxygenated compounds derived from full scan SIFT-MS data.*

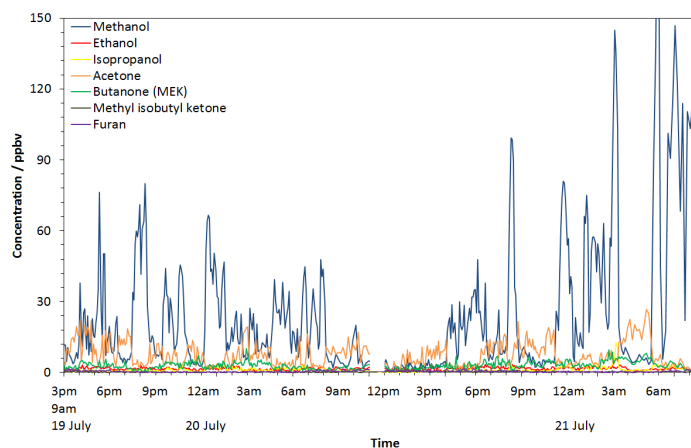
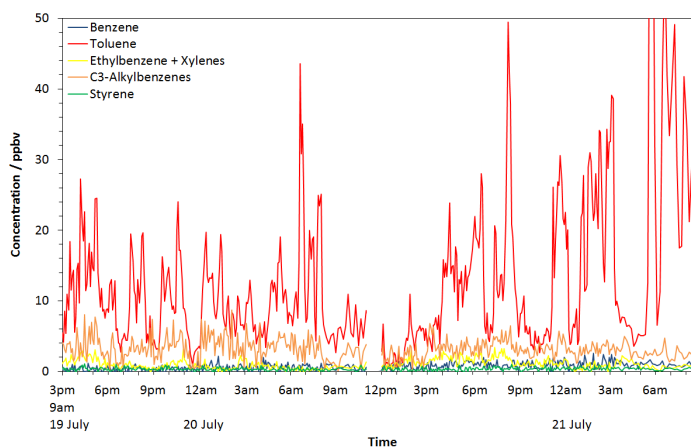
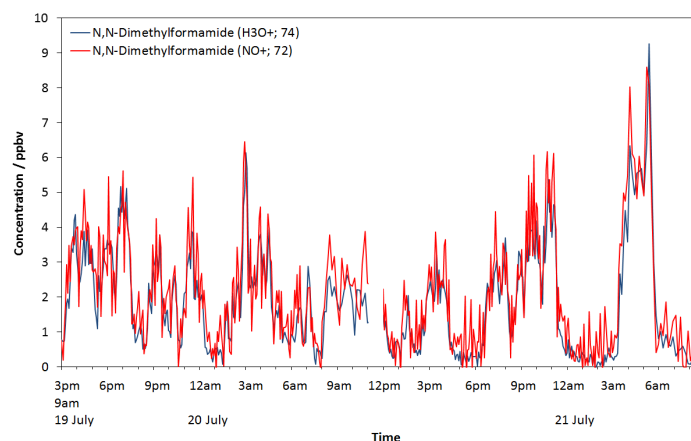


Figure 2. Comparison of the performance of two SIFT-MS reagent ions for analysis of N,N-dimethylformamide.*



* The instrument was used to perform other analyses between 11am and 12pm on 20July.