Comprehensive, High-Throughput Analysis of Emissions from Automotive Cabin Components

Key Benefits

Aldehydes and VOCs analyzed in one simple analysis

Very low cost per sample

High sample throughput with automated analysis option

Easily configurable analyses for different components or to meet different specifications

The ease of use, sensitivity, selectivity, and high-throughput analysis provided by Syft Technologies' Voice200*ultra* SIFT-MS solution provides simple, reliable, and economic analysis of volatile emissions from automotive cabin components.

Volatile organic compounds (VOCs) and aldehydes are frequently emitted from automotive components. Some emissions are highly toxic (including the carcinogens benzene and formaldehyde), whereas others have nuisance value. Recognizing the public health issues, regulatory bodies and industry increasingly seek to reduce exposure to these emissions. Original equipment manufacturers (OEMs), for example, impose emission standards on raw material and component suppliers to prevent inclusion of sub-standard products in finished vehicles.

Historically, however, no technology has been able to provide simple, rapid, and comprehensive analysis for the diverse volatile emissions. Two traditional laboratory-based analytical techniques (gas chromatography mass spectrometry (GC/MS) and high-performance liquid chromatography (HPLC)) are widely used to cover most compounds, but analysis is very expensive and sample turnaround is slow.

Selected ion flow tube mass spectrometry (SIFT-MS) addresses the shortcomings of these traditional analytical techniques with a unique combination of benefits that enable it to rapidly quantify diverse volatile emissions with very high selectivity over wide linear and dynamic ranges. Figure 1 shows the results of SIFT-MS analysis of five synthetic cabin components for a diverse variety of VOCs and aldehydes (reported in micrograms detected per gram of component). Each sample was analyzed in less than one minute.

The comprehensive analysis provided by SIFT-MS – coupled with its high throughput and very low cost of ownership – provides an ideal tool for certifying conformance of every batch of product across diverse compound classes, including aldehydes, phthalates, aromatics, chlorinated organics, and organotin compounds. SIFT-MS eliminates expensive sampling consumables, minimizes sample preparation prior to analysis, and facilitates rapid feedback on product quality. Both the supplier and the OEM benefit, since batches with higher emissions can be identified before shipping, eliminating costly rejections by the OEM. Implementation of wide-scale product screening also enables the supplier to identify product issues earlier, optimizing production processes and reducing product losses or re-work.

Experimental Method*

Samples were weighed, then placed in 1-liter Schott bottles and sealed with septa. Samples were incubated at 60°C for 3 hours prior to headspace analysis using SIFT-MS.

* Note: this work pre-dates the automated system and was performed manually using large samples.

SIFT-MS Analysis

Instrument	Voice200*ultra*
Inlet type	High performance
Sample flow	25 sccm
Analysis type	Selected Ion Mode (SIM)
Reagent ions	H_3O^+, NO^+, O_2^+
Compounds	Aldehydes, aromatic and aliphatic hydrocarbons, dichlorobenzene and phthalates
Analysis time	<1 minute

Further Reading

Syft Application Note: *Rapid, On-Site Vehicle Interior Air Quality (VIAQ) Testing, Using SIFT-MS*

Syft Brochure: *Automation Applications*

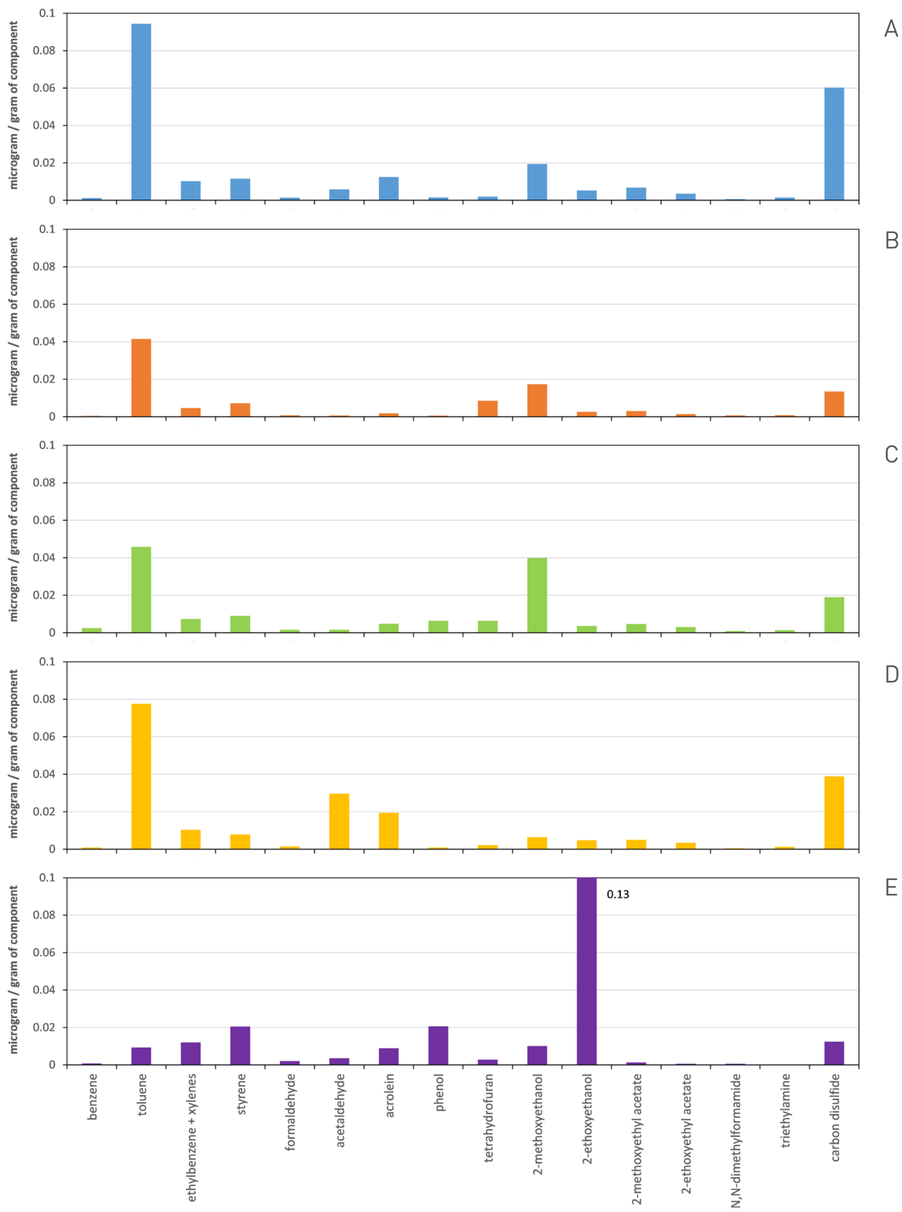
Syft Brochure: *LabSyft: Laboratory Software for SIFT-MS Applications*

Syft Datasheet: *Syft Headspace Autosampler Package*

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.

V.S. Langford, I. Graves, M.J. McEwan (2014), *Rapid monitoring of volatile organic compounds: a comparison between gas chromatography/mass spectrometry and selected ion flow tube mass spectrometry*, Rapid Commun. Mass Spectrom, 28, 10.

Figure 1: VOC content of various car components: (a) foam laminated sample, (b) fabric laminated sample, (c) adhesive laminated sample, (d) compression molded composite sample, and (e) injection molded sample.



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