



AUTOMATION APPLICATIONS

SYFT TECHNOLOGIES



AUTOMATION APPLICATIONS OF SIFT-MS

Automation has been widely utilized by traditional chromatographic techniques for many years, enabling instrumentation to be productive 24/7 – a critical consideration because sample throughput is typically only 20 to 60 samples in 24 hours due to the slow analysis. Further, chromatography itself can be a major limitation of traditional techniques because breadth of analysis is constrained: multiple columns or several techniques may be required to comprehensively analyze one sample.

The advent of selected ion flow tube mass spectrometry (SIFT-MS) – a cutting-edge analytical technique that comprehensively analyzes samples to parts-per-trillion (ppt) concentrations within seconds – redefines automation of volatile organic compound (VOC) and inorganic gas analysis. Rapid SIFT-MS analysis provides unique opportunities for high-throughput sample analysis, whether it be for routine VOCs, or chromatographically challenging

species (such as ammonia, formaldehyde, hydrogen chloride, and hydrogen sulfide), or any combination of these.

SIFT-MS automation presents a major breakthrough in high-throughput headspace and gas analysis, with throughputs in excess of 100 samples/hour. This brochure provides examples of automation applications of SIFT-MS.

VERY-HIGH THROUGHPUT HEADSPACE ANALYSIS

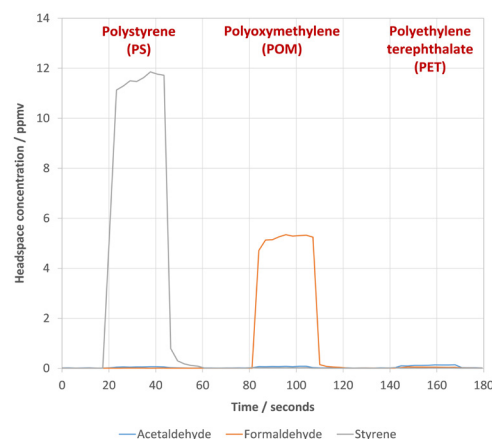
SIFT-MS provides a very rapid and highly sensitive solution for the detection of VOCs and inorganic gases in headspace samples. Benefits of SIFT-MS include:

- Direct analysis of very volatile solvents through elimination of chromatographic separation.
- Very high throughput screening coupled with high sensitivity provides rapid warning of quality issues and greatly reduces the test cost per analysis.

- Wide linear and dynamic ranges enable one instrument to be applied to multiple analytical tasks.
- High selectivity and comprehensive analysis provided by eight rapidly switchable reagent ions.

Applications of automated SIFT-MS headspace analysis include:

- Target compound analysis in foods and beverages
- Objective sensory screening
- Residual solvents in pharmaceuticals and packaging.



Simple residual monomer analysis of different powdered polymer pellets, including formaldehyde from POM polymer.

MULTIPLE HEADSPACE EXTRACTION (MHE)

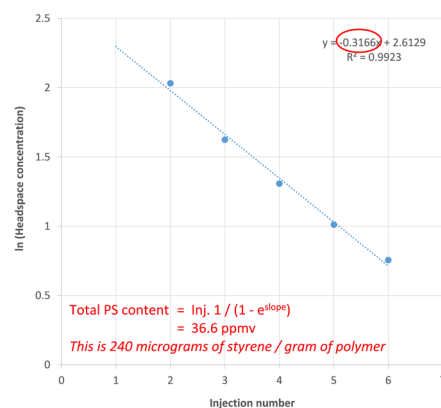
MHE is a form of static headspace analysis (SHA) that offers significant advantages over equilibrium SHA when working with solid materials and samples where the composition of the matrix varies from sample to sample. Complications due to partitioning are eliminated and the actual amount of VOC in the sample is determined.

SIFT-MS makes the required series of multiple headspace extractions very rapidly. This means

that MHE can be used, without suffering the serious time penalty associated with MHE when used in conjunction with GC or GC/MS.

Applications of MHE include:

- Residual solvents in packaging materials
- Analysis of thermally labile materials
- Volatile organic compounds in soil samples.



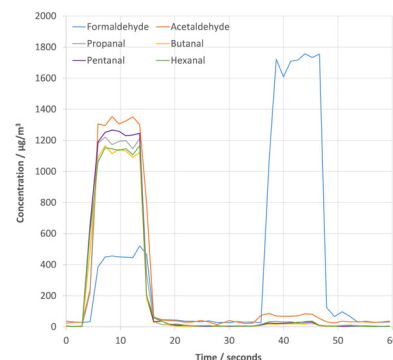
Automated MHE using SIFT-MS: residual styrene monomer determination in polystyrene (PS) pellets.

RAPID ANALYSIS OF SAMPLE BAGS AND CANISTERS

The comprehensive, direct gas analysis capabilities of SIFT-MS make it ideally suited to high-throughput analysis of industry-standard gas sampling devices, such as Tedlar sample bags or SUMMA canisters. No derivatization, drying, or pre-concentration is required for direct analysis to pptv levels. Further, reactive and labile compounds are readily detected and analyzed before they degrade.

Applications of automated gas analysis include:

- Sample bag analysis for occupational safety and stack gas applications
- Canister analysis for ambient, indoor air, and process gas analysis
- Canister cleanliness screening
- Automated, comprehensive odor analysis (aldehydes, amines, organosulfurs, and volatile fatty acids are all detected effectively in seconds).



Instant quantitation of compounds from Tedlar bags – including aldehydes!

CONTINUOUS HEADSPACE ANALYSIS (CHA)

Chromatographic techniques are highly impractical probes of dynamic processes, because they require that multiple grab samples be taken, followed by prolonged analysis.

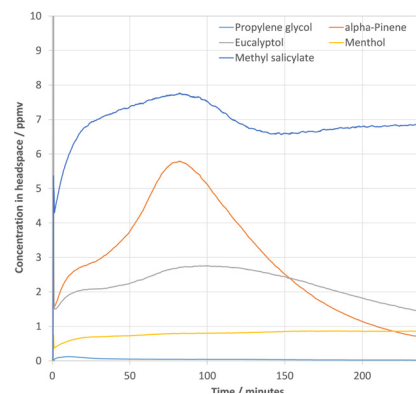
As a direct analysis technique, SIFT-MS makes monitoring dynamic processes simple due to the:

- High time resolution
- High sensitivity
- Comprehensive analysis via multiple reagent ions.

When coupled with automation, samples can be run 24 hours/day, speeding up R&D and/or QA testing.

Applications of CHA include:

- Analyzing long-term fragrance or aroma changes
- Analyzing absorption of VOCs by “scrubbing” materials
- Monitoring the progress of reactions in chemical processes.



Continuous analysis of fragrance components as they are slowly released from “Deep Heat”-brand muscle rub.

SUMMARY

SIFT-MS provides highly sensitive, selective, and non-discriminatory analysis. SIFT-MS coupled with autosampler technology delivers throughputs that are unparalleled by traditional technologies.

Applications include:

- Rapid headspace analysis for residual solvents, residual monomers, product quality assurance;
- Efficient, cost-effective multiple headspace extraction to quantify volatile residues in polymers and other materials;
- Simple, instant analysis of gas samples in Tedlar bags and canisters, with no pre-concentration or pre-treatment;
- Continuous sample analysis to probe dynamic processes, such as fragrance release or product degradation.

Syft Technologies is committed to its customers' success, delivering simplicity of operation, fully integrated solutions, user-friendly software, product reliability, and extensive after-sales support.

SELECTED ION FLOW TUBE MASS SPECTROMETRY (SIFT-MS)

SIFT-MS is the leading real-time analytical technique for comprehensive gas analysis to ultra-trace levels.

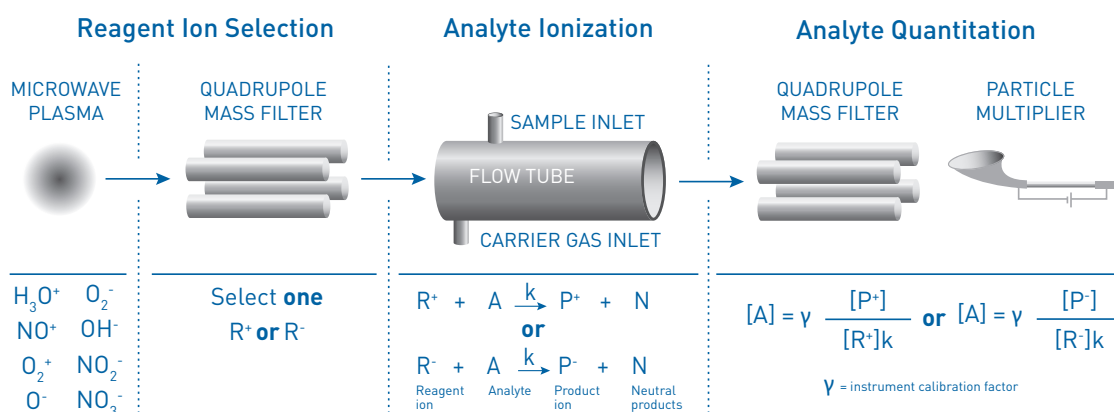
SIFT-MS uses ultra-soft, precisely controlled chemical ionization coupled with mass spectrometric detection to rapidly quantify VOCs and permanent gases to low part-

per-trillion concentrations by volume (pptv). Eight chemical ionization agents (reagent ions) are applied in Syft instruments: H_3O^+ , NO^+ , O_2^+ , O^- , O_2^- , OH^- , NO_2^- , and NO_3^- .

These eight reagent ions react with VOCs and inorganic gases in very well controlled ion-molecule reactions but they do not react with

the major components of air (N_2 , O_2 , and Ar). This enables SIFT-MS to analyze air at trace and ultra-trace levels without preconcentration.

Rapid switching of eight reagent ions provides unsurpassed selectivity among direct MS techniques.



BENEFITS OF SYFT SIFT-MS INSTRUMENTS

- Instantaneous identification and quantitation of VOCs and inorganic gases using a fully integrated, extensive chemical ionization library
- Real-time air analysis to low part-per-trillion by volume (pptv) concentrations with class-leading selectivity, no preconcentration, and high robustness to humidity
- Analysis of chemically diverse VOCs and organics in a single analysis (e.g. aldehydes, amines, and organosulfur compounds)
- Ease of operation with push-button simplicity (including smartphone access), no sample preparation, and comprehensive LabSyft data analysis software
- Designed and engineered for use in commercial, industrial and research environments, with easy integration into sample delivery systems and IT infrastructure
- Reliable, low maintenance instruments and accessories, with market-leading after-sales support

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