



PTR-TOFMS

VOC Monitoring for Science and Industry

EMISSIONS



BREATH



AROMA



SEMICON



PETROCHEMICAL



AIR QUALITY

THE SOLUTION FOR REAL-TIME TRACE GAS ANALYSIS



PTR-TOFMS: One Technology. Infinite Applications.

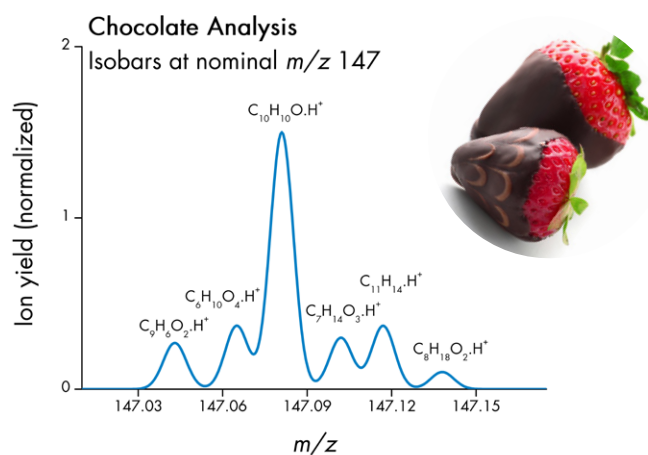
PTR-TOFMS is a gold standard for real-time trace gas analysis, trusted by experts across a vast spectrum of research and industrial sectors. In Environmental Research, our systems track atmospheric chemistry and trace gas emissions in environments ranging from remote wilderness to dense urban centers and indoor spaces. In the Food, Flavor and Fragrance Industry, we provide the tools to deconstruct the complex aroma profiles of coffee, olive oil, wine, herbal extracts, and perfumes. Beyond the lab, we develop specialized Industrial VOC Monitoring solutions for mission-critical deployments, including semiconductor cleanrooms, chemical production sites, and petrochemistry. Whether it's monitoring vehicle emissions or ensuring the quality of premium consumer goods, IONICON provides the real-time data needed to move forward.

Food & Flavor

Exploring Aroma and Aftertaste

Aroma and its perception can influence buying decisions. It is therefore indispensable for the industry to understand what we smell and taste when consuming a product.

- **Real-Time Monitoring:** Capture dynamic variations in aroma release as they occur.
- **Direct Air Analysis:** Analyze mouth- and nose-space air without sample preparation.
- **High Mass Resolution:** Resolve complex chemical signatures and identify isobaric compounds.

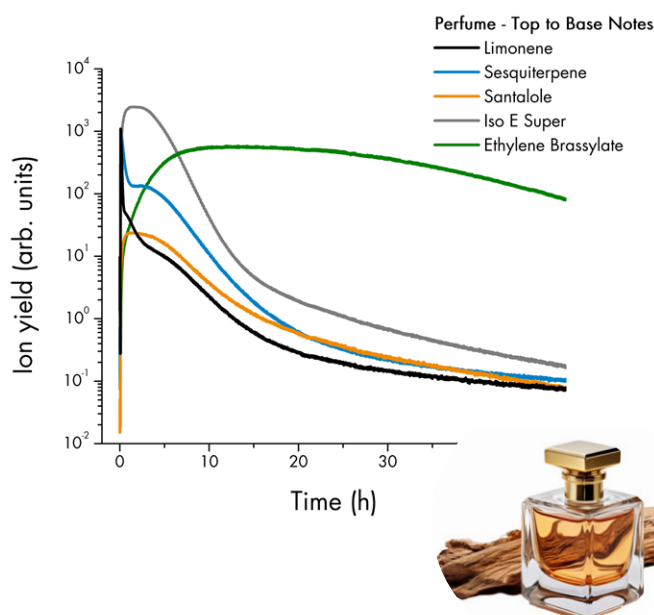


Fragrance

The Perfume Pyramid

By providing high-resolution data without the need for complex sample preparation, PTR-TOFMS captures the entire lifecycle of perfumes and is therefore the definitive tool for fragrance analysis.

- **Continuous Monitoring:** Capture the complete olfactory journey over time.
- **Broad Dynamic Range:** Simultaneously quantify high-concentration solvents and ultra-trace aromatics.
- **Rapid Screening:** Effortlessly profile complex aroma systems with high-speed detection.



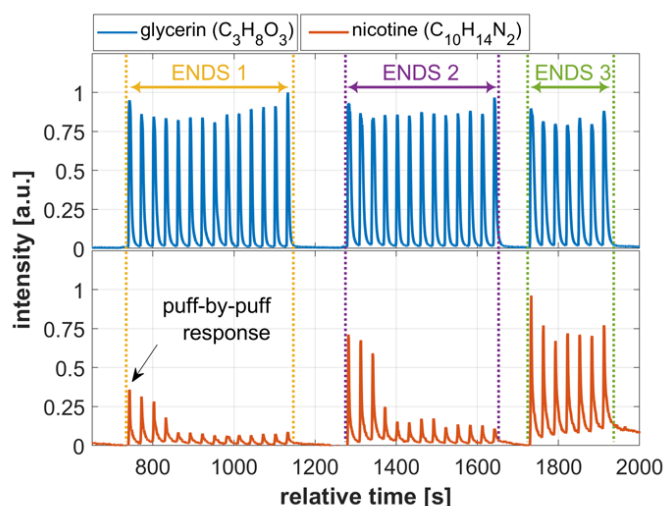
Flavor & Breath

Exhaled Breath Aroma Analysis

Aroma is handled by the nose and responsible for about 80% of what we perceive as Flavor. IONICON's NASE (NoseSpace Air Sampling Extension) revolutionizes in-vivo aroma perception monitoring through real-time nasal cavity sampling.

A dedicated sampling system specifically for Electronic Nicotine Delivery Systems (ENDS; e.g. e-cigarettes) allows for the precise quantification of puff-by-puff emission variations and the tracking of chemical exposure for both users and bystanders.

- **Real-Time Flavor Release:** Instantaneous monitoring of aroma compounds ("nose-space") during consumption of food or beverages.
- **Exposure & Deposition:** Precise quantification of nicotine and flavors from sources like e-cigarettes (ENDS) on a puff-by-puff basis.
- **In-Vivo Analysis:** Maximum user-friendliness and ease of use thanks to direct injection sampling of the exhaled breath.



Medical Applications

A Non-Invasive Window into the Body with Real-Time Breath Analysis

IONICON's PTR-TOFMS technology transforms breath analysis by providing non-invasive, real-time monitoring of volatile organic compounds (VOCs). It enables the immediate detection of biomarkers for diseases and metabolic changes, without the need for complex sample preparation.

The BET (Buffered End-Tidal) breath sampler in particular makes breath analysis as easy as it can be. This dedicated inlet system buffers the end-tidal part of human breath and guarantees an optimal transfer to your PTR-TOFMS device, for single digit pptv LoDs – from one exhalation.

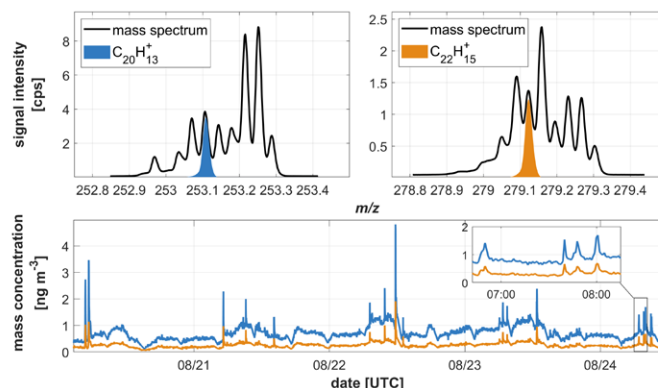
- **Real-Time Monitoring:** Instantaneous tracking of drug metabolism and physiological responses.
- **Biomarker Discovery:** High sensitivity (sub-pptv) to identify trace-level disease indicators.
- **Direct Sampling:** Hygienic analysis of single breath cycles for high-throughput screening.

Advanced Research

Quantifying Atmospheric Organics

Advanced trace gas analysis provides real-time monitoring of complex atmospheric compositions. PTR-TOFMS enables the precise quantification of VOCs from biogenic and anthropogenic sources, allowing scientists to track chemical transformations and identify pollution precursors as they evolve.

- **Wide Range of Compounds:** Detect almost all non-methane organics, from simple hydrocarbons to highly oxidized compounds.
- **Extreme Sensitivity:** Quantify trace gases at single-digit pptv levels without sample pre-concentration.



Gas and Particle Phases

IONICON's CHARON inlet enables the real-time molecular characterization of sub- μ m organic particulate matter.

- **Detects a Wide Range of Compounds**, from intermediate (IVOCs) to extremely low volatility (ELVOCs).
- **Molecular-Level Analysis:** Characterizes condensed organics at the molecular level with sensitivities down to single-digit pg/m³.



Flight Campaigns & Airborne Research

IONICON real-time VOC analyzers are essential for research flight campaigns, supporting air quality networks, and public safety. Equipped with a CHARON particle inlet, the capabilities of traditional PTR-MS extend to measuring particulate organic compounds. Since aerosols significantly influence atmospheric dynamics, cloud formation, and climate change, PTR-TOFMS provides the critical data needed to understand these complex processes.

Mobile and Stationary Urban Air Quality Networks

IONICON's robust technology is engineered to withstand the vibrations and shocks of mobile platforms, making our instruments the preferred choice for mobile labs aboard vans and ships. This mobility enables the real-time mapping of hazardous pollutants in smoke plumes and high-resolution emission studies of vehicles in urban environments, providing critical data to complement stationary networks.



Flux Measurements

Real-time flux measurements of Biogenic Volatile Organic Compounds (BVOCs) are made possible through PTR-TOFMS. By combining high sensitivity with rapid response times, this technology allows for the precise calculation of Eddy Covariance fluxes, revealing how ecosystems exchange trace gases.

- **Rapid Data Acquisition:** Up to 20 Hz for precise vertical flux calculations.
- **Trace Gas Identification:** High mass resolution to distinguish complex biogenic signatures.



Agriculture and Livestock

Ecosystem and Livestock Monitoring

PTR-TOFMS provides real-time insights into biological and geological processes, from soil-atmosphere gas exchange to animal health. It enables the precise study of microbial processes and carbon cycling, while monitoring plant and livestock emissions under varying conditions.

- **Holistic Monitoring:** Track dynamic VOC emissions from soil, roots, and plants under stress or herbivore attacks.
- **Livestock & Air Quality:** Monitor trace gases from cattle and poultry to optimize animal health, as well as to identify pollution precursors and odor-causing emissions.
- **High Sensitivity:** Detect complex organic compounds and microbial tracers at sub-pptv levels with high mass resolution.

Emissions

Amine Emissions in Carbon Capture

Real-time monitoring of amine emissions is essential for ensuring environmental safety and process efficiency in Carbon Capture and Storage (CCS) facilities. This high-sensitivity approach replaces slow offline sampling, enabling immediate process optimization and rigorous regulatory compliance in post-combustion CO₂ capture.

- **Instantaneous Detection:** Monitor amines and hazardous degradation products, such as nitrosamines, as they evolve.
- **Extreme Sensitivity:** Quantify emissions at extremely low concentrations to meet strict safety standards.
- **High-Speed Analysis:** Replace manual sampling with automated, continuous monitoring for enhanced process control.



Industrial Safety

Real-Time Detection of Hazardous Volatile Compounds

Real-time PTR-TOFMS monitoring ensures industrial safety by detecting Toxic Industrial Chemicals (TICs) and hazardous emissions. It enables continuous air quality control in chemical plants and storage facilities, protecting workers and the environment.

- **Split-Second Response:** Enables immediate alarm triggering during leakage.
- **Multiplexing Capabilities:** Allows for monitoring several locations with one system.
- **Clear Identification:** Offers unambiguous identification of complex TICs at ultra-low concentrations.

Petrochemicals

Monitoring of Syngas and Other Gas Processes

Real-time monitoring of trace impurities and complex hydrocarbon mixtures transforms petrochemical analysis and enables rapid quality control and process optimization while safeguarding critical equipment from contamination.

- **Rapid Quality Control:** Monitor syngas and other process gases for instant purity verification.
- **Complex Mixture Analysis:** Identify and quantify a wide range of hydrocarbons.

AMC Clean-Room Monitoring

Contamination-Free Ambients

Monitoring Airborne Molecular Contaminants (AMCs) in semiconductor cleanrooms is revolutionized by industry-leading precision. PTR-TOFMS ensures high yields by detecting organic and some inorganic acids, bases, and dopants, preventing costly wafer defects and process degradation. IONICON's real-time trace gas analyzers for the semiconductor industry play a key role in AMC contamination management in cleanrooms, FOUPs, and in the field of Advanced Packaging, a key technology for manufacturing AI-chips.

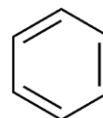
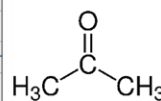
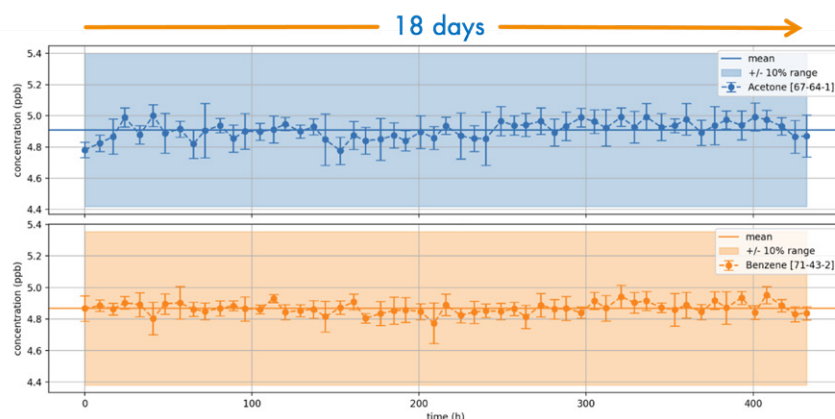
- **Ultrafast Response:** Maintain high performance through real-time monitoring and rapid identification of contamination events.
- **Multi-Port Sampling:** Monitor several production areas simultaneously to ensure facility compliance.



Fenceline & Property Line Monitoring

Advanced Perimeter and Emissions Tracking

Protecting industrial perimeters and local air quality requires rapid, precise detection of hazardous emissions. Our high-sensitivity instruments enable continuous tracking of VOCs and inorganics, ensuring regulatory compliance and worker safety through real-time data. Beyond standard fenceline and ambient air quality monitoring for petrochemical and oil and gas facilities, our systems provide immediate leak detection for failures caused by corrosion or thermal cycling. This precision extends to clearance testing for safe parts handling and direct stack emission monitoring of hazardous organic trace gases. By utilizing ultra-fast multi-port multiplexing, we achieve a significantly lower cost per sampling point, delivering a cost-efficient solution that never compromises on safety or accuracy.





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Contact us to solve your analytical challenge!

As the pioneers and global leaders in PTR-MS, we provide ultra-sensitive technology for detecting Volatile Organic Compounds (VOCs). Developed by our founders, our analyzers have supported hundreds of high-impact publications and continue to advance research across diverse scientific fields. We translate this excellence into industrial performance through real-time solutions for process monitoring, quality control, and emissions tracking. By eliminating traditional lab wait times, IONICON empowers partners to make immediate, data-driven decisions that enhance efficiency, ensure compliance, and guarantee product consistency.

THE WORLD'S LEADING PTR-MS COMPANY