AerodyneResearch

Technology Enhancing Science

Compact GC-PTR-TOF-MS

A compact, field-deployable GC-PTR-TOF-MS for the in situ monitoring of volatile organic compounds (VOCs)

Online gas chromatograph (GC) system with integrated thermal desorption preconcentration

Proton Transfer Reaction Time-of-Flight Mass Spectrometer

Applications

- Long-term monitoring of VOCs, including primary emissions and oxidation products.
- Quantitative detection of environmentally relevant biogenic and anthropogenic VOCs, including air toxics and ozone precursors.
- Mobile monitoring for detailed source characterization.

Data Analysis Software

Analysis software packages offer fully-autonomous, real-time processing of mass spectral and chromatographic data.

- **AuTofware** offers automated data pre-averaging, mass calibration, diagnostic capabilities, background and calibration corrections, and data export procedures.
- **AutoTERN** works seamlessly with AuTofware to provide automated chromatographic analysis of processed mass spectral data. AutoTERN includes automated retention time correction and chromatographic peak fitting.

Advantages

- Field-deployable. Compact, robust design makes advanced, research-grade measurements possible in challenging and remote environments.
- Fully automated switching between GC-PTR and direct-PTR measurements, providing automated acquisition of both online isomer-resolved data without sacrificing high time resolution detection.
- Innovative ionization cell provides exceptional sensitivity and acquisition speed without humidity dependence.
- GC thermal desorption preconcentration increases system sensitivity while the GC preseparation enhances compound resolution and aids interpretation of complex spectra.
- **Low detection limits:** < 1 - 5 ppt (10 min) GC-PTR; 10 ppt (1 min) direct-PTR detection. Compact footprint (76 x 84 x 80 cm). Low power (< 800 W typical).
- Fully automated analysis software provides real-time processing for a faster, more efficient data output.

Compact GC-PTR-TOF-MS

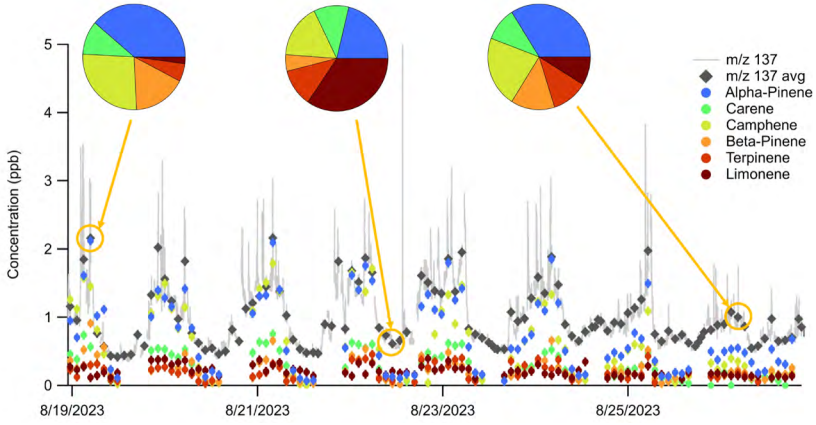
Specifications

Weight, Size, Power

Weight: 150 kg
Volume: 0.51 m^3
Dimensions: 76 cm x 84 cm x 80 cm
Power: 800 W (typical); < 1700 W (start-up)

	Compact PTR-TOF	GC PTR-TOF
Sensitivity (cps/ppb)	1,000	Enhanced by a factor of 300*
Mass Resolution	2,200	GC dimension of separation
Limit of Detection (ppt)	< 10 (1 min)	< 1 – 5 (speciated, 10 min)

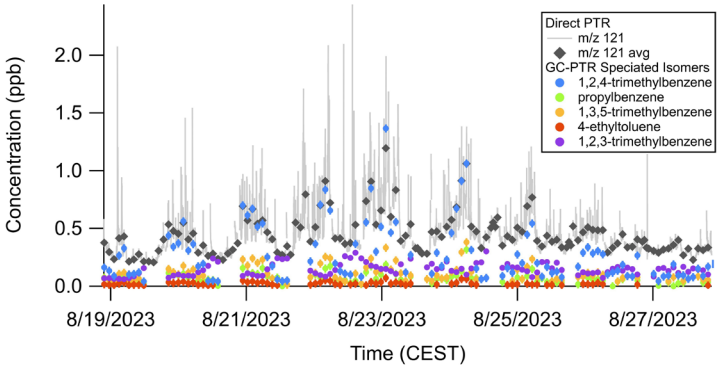
* Due to preconcentration by the GC, enhancement by factor of 300 typical for a 1 L preconcentrated sample.

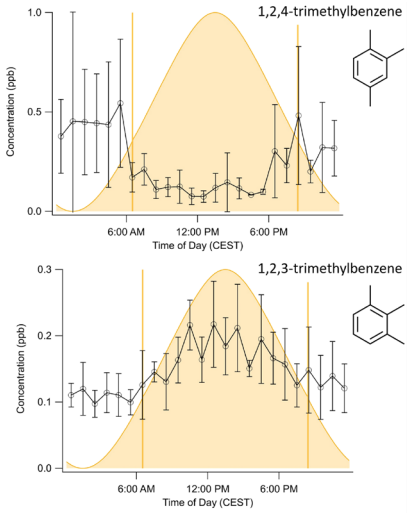


Compact GC-PTR-TOF time series demonstrating ambient detection of monoterpenes. The system is fully automated to switch between GC resolution (colored markers) of the isomers and direct detection (light gray) of their summed characteristic ion. The pie charts demonstrate changing isomer compositions, measured by the GC-PTR.

Switching between GC- and direct-sampling, occurring on a user-defined interval, results in semi-continuous isomer speciation without the loss of high time resolution PTR-TOF data.

Compact GC-PTR-TOF time series demonstrating the detection of ambient C9 aromatics. With regular GC operation, the system provides isomer resolved diurnal patterns, which give information about source identification, health impacts, photochemical processes and reactivity, and aerosol formation.





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