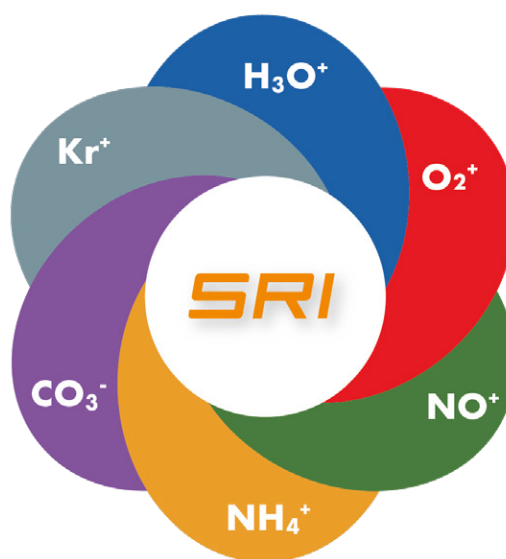




Selective Reagent Ionization for PTR-MS



IONICON PTR-MS FACTS

- Soft and efficient chemical ionization
- Absolute VOC quantification without compound specific calibration
- Market-leading detection limits (< 1 pptv)
- Direct air sampling, no sample pretreatment needed
- Time-of-flight mass spectrometry for best time resolution without losses
- Peak separation with highest mass resolution ($m/\Delta m > 20\,000$)

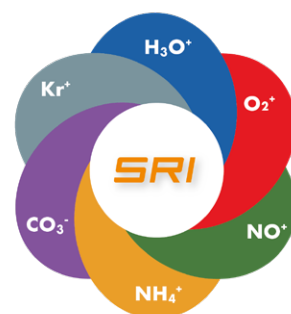
Selective Reagent Ionization for PTR-MS

Proton Transfer Reaction - Mass Spectrometry (PTR-MS) is a well-established chemical ionization technique for real-time trace gas analysis. PTR-MS has a wide range in areas including environmental and atmospheric research, food science, flavor and fragrance analysis, medicine, air-quality monitoring, and industrial applications. PTR-MS enables simultaneous monitoring of the vast majority of volatile organic compounds (VOCs) present in ambient air. IONICON instruments are recognized for real-time quantification of VOCs with market leading detection limits (< 1 pptv) without the need for sample pre-treatment. IONICON's new InVion source enables fast and automated switching between positive and negative reagent ions, expanding the range of detectable compounds of IONICON's genuine PTR-MS technology.

SRI: One step closer to the Universal Trace Gas Analyzer

Supported reagent ions and their benefits

- **H_3O^+**
Suitable for most VOC classes: aromatics, ketones, aldehydes, acids, amines, etc.
Quantification without compound-specific calibration
Proton-Transfer-Reaction (proton affinity > 691 kJ/mol)
- **O_2^+**
Sensitive to halogen species (e.g. I_2 , OI , BrO), aromatic species, etc.
Quantification without compound-specific calibration
Charge transfer ionization (IE < 12.07 eV)
- **NO^+**
Specific and soft ionization, a good choice for e.g. alkanes, and aldehydes
Enables separation of isomeric compounds
Select between charge transfer (IE < 9.26 eV) and adduct ionization
- **NH_4^+**
Suitable for e.g. HOMs, organonitrates, peroxides, and amines
Fragmentation-free ionization of oxidized organics
Select between proton transfer and adduct ionization
- **CO_3^-**
Very sensitive to inorganic and organic acids
CIMS-like, fragmentation-free ionization
Deprotonation reaction
- **Kr^+**
Suitable for substances such as CH_4 , CO , CO_2 , NO_2 , SO_2 , etc.
Even higher ionization energies than O_2^+
Charge transfer ionization (IE < 14 eV)



Fast reagent ion switching

The optimized design of the new InVion source enables fast reagent ion switching within single seconds between H_3O^+ , O_2^+ , NO^+ and even NH_4^+ .

Long-term stability

Despite continuous cycling through ionization modes, the long-term stability and durability of the new InVion source are not affected.

Reagent ion purity

All supported reagent ions can be produced at highest purity of >98%, thereby minimizing ionization artifacts.

Patent protection for reagent ions

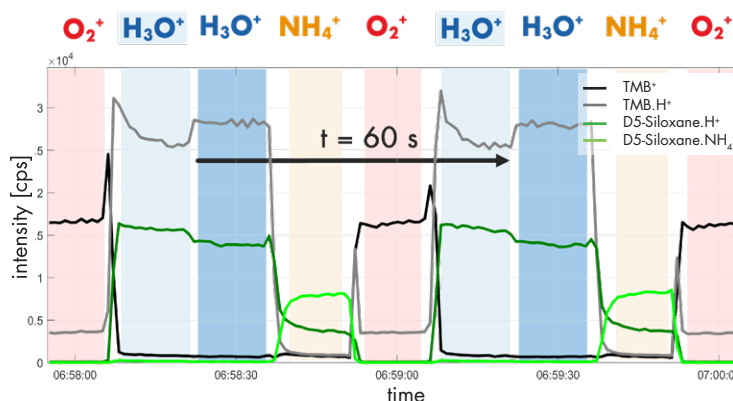
The Production of NH_4^+ reagent ions without the need of any hazardous ammonia is protected by the following patents: US11342171 (B2); CN111386590 (B); EP3503161 (B1). The utilization of high IE reagent ions (e.g. Kr^+ , Xe^+) for the analysis of air is protected by these patents US9188564 (B2); EP2606505 (B1).

SRI Application Example

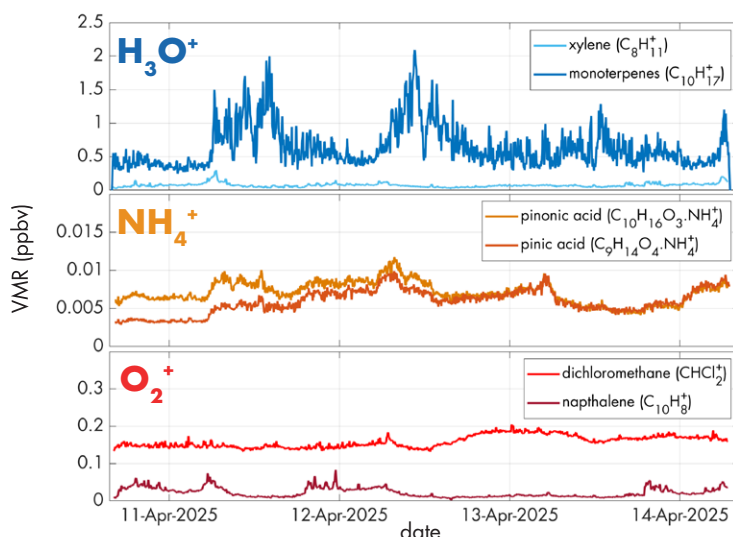
Ambient measurements

Ambient air was measured continuously cycling through H_3O^+ , O_2^+ and NH_4^+ reagent ions. H_3O^+ excels in quantifying the vast majority of VOCs. Soft adduct ionization with NH_4^+ is the optimal choice for detecting highly oxygenated compounds and O_2^+ is highly sensitive to halogen species and aromatics.

- New InVion Source
- ALL-IN-ONE Solution
- Bipolar Ionization



Demonstration of the instrument's capability for fast and reproducible switching between ionization modes (O_2^+ , H_3O^+ , NH_4^+) and two exemplary reaction energies for H_3O^+ of low and high E/N in light and dark blue, respectively, supporting time-resolved multi-mode analysis.



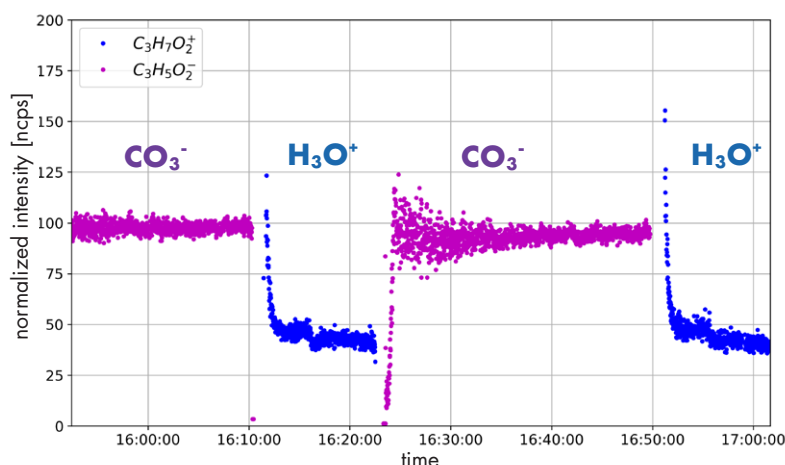
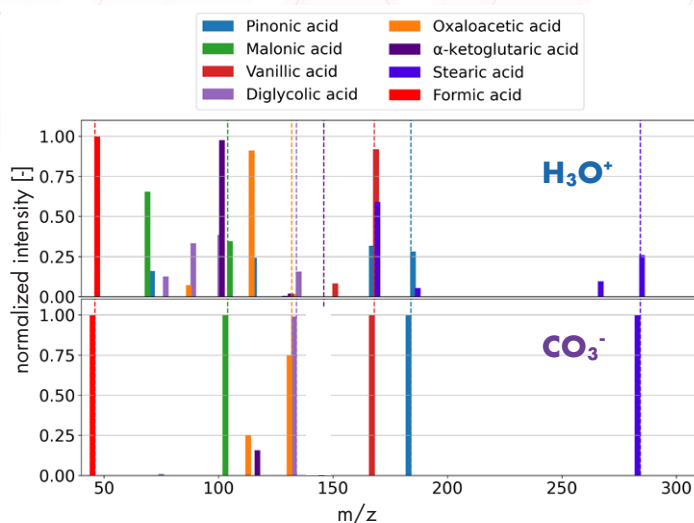
Negative ionization with CO_3^-

Selective detection of acids

CO_3^- enables sensitive, selective detection of inorganics such as SO_2 , H_2SO_4 , HNO_3 and organic acids like perfluoroalkyl carboxylic acids. This soft ionization minimizes fragmentation.

Polarity switching

With the push of a button the polarity is switched. Propionic acid can be detected in positive H_3O^+ and negative CO_3^- ionization modes. Thanks to IONICON's ability to normalize to the respective reagent ion, detected signals stabilize within a couple of minutes.



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Contact us to solve your analytical challenge!

We are the pioneers and global leaders in Proton Transfer Reaction - Mass Spectrometry (PTR-MS), a highly sensitive technology for detecting volatile organic compounds (VOCs), developed by our company's founders. Our trusted PTR-MS analyzers have supported hundreds of high-impact publications and continue to advance research across diverse scientific fields.