

A new PTR-TOF reaction cell combining linear and oscillating fields

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WHAT IS PTR-TOF?

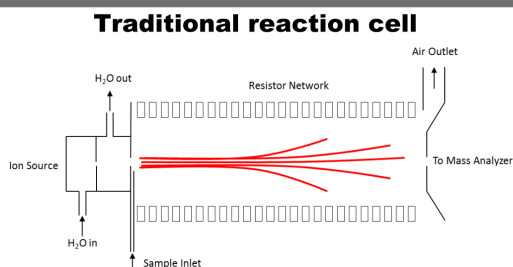
Proton Transfer Reaction - Mass Spectrometry (PTR-MS) is a technique of increasing popularity for online monitoring of volatile organic compounds (VOCs).

The working principle of PTR-MS is chemical ionization upon reactions between primary H_3O^+ ions and the analyte VOCs.

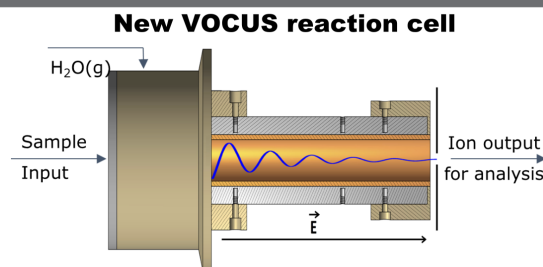
Proton transfer reactions occur within a reaction cell having very stable and controlled electric fields, pressure, and temperature.

The electric fields within the cell move the primary and product ions towards the detector.

VOCUS REACTION CELL



Conventional reaction cell designs are based on a linear, DC field along the drift axis. Ion losses occur at the reaction chamber cell walls because of diffusion and scattering. This problem affects the instrumental sensitivities and limits of detection (LOD)



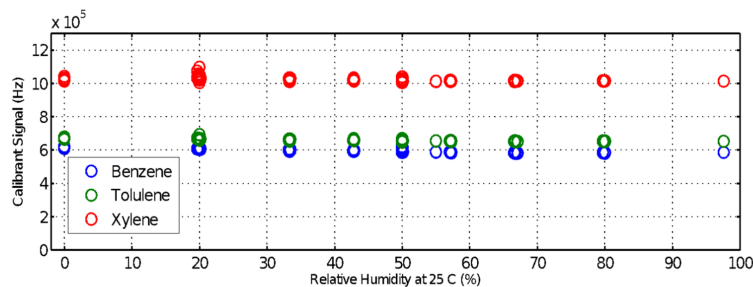
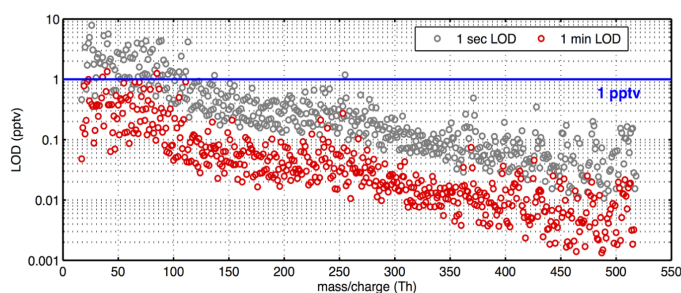
The new solution involves adding oscillating RF fields on top of the linear field. The additional ion focusing which is reached in this way increases the transmission of ions towards the detector region.

ADVANTAGES

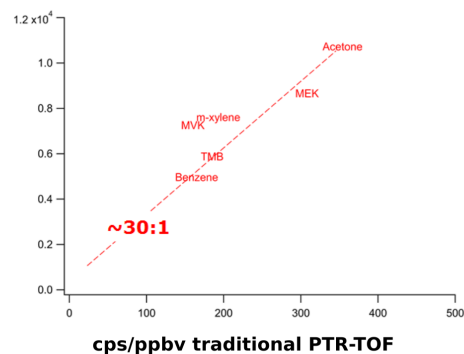
~30x improvement in sensitivity compared to state-of-the-art PTR-TOF instrument

Previous boundaries in LODs are overcome

VOCUS PTR-TOF still operates under traditional PTR conditions allowing sensitivity calculation to be utilized



cps/ppbv VOCUS PTR-TOF



State-of-the-art traditional PTR-TOF sensitivities from Atmos. Meas. Tech., 9, 2735-2752, 2016

Traditional PTR-TOF suffer from a humidity dependence of the signal. This is a strong limitation and requires empiric corrections.

Vocus reaction conditions are not changed even with very large changes in water vapor concentrations.

This is true even in the case of VOCs having strong humidity dependence in traditional PTR-TOF, such as Benzene.

VOCUS PTR-TOF



Real-time VOC Analysis with Market Leading Performance

- > Higher sensitivity, lower LODs, better precision than traditional PTR-TOF
- > No dependence on sample humidity
- > Coupling with ultimate TOF (R>12000)

