Introduction

The possibility of on-line measurement and detection of compounds with high sensitivity has been highlighted as one of the main advantages of Proton-Transfer-Reaction – Mass Spectrometry (PTR-MS) [1] since its introduction in the 1990s. The quest for the highest sensitivity has recently led to a multitude of reaction chamber designs, all of which have in common that they employ RF fields to guide and focus the ions. However, this comes with a major drawback, namely that the well-defined ion chemistry in PTR-MS, which is one of the most important features of this technology, is sacrificed [1].

Here we present the FUSION PTR-TOF 10k, which is part of IONICON's NextGen PTR-TOF instrument series and combines the novel TRION source and FUSION drift cell. The novel TRION source plus the FUSION reaction chamber and a high resolution TOF analyzer are the new benchmark for nearly instant reagent ion switching, ppqv limit of detection and reliable E/N-values.

Key Advantages

A unique combination of:

- high sensitivities up to 30,000 cps/ppbv
- LoDs down to <100 ppqv
- selective reagent ion (SRI) switching in about 200ms, high stability of different reagent ion sources
- FUSION PTR technology is best combined with ioniTOF 10k with a mass resolution of typically 10,000 – 15,000 m/Δm (FWHM)
- patented TRUE/N ion chemistry quality

Results

The performance of the novel FUSION PTR-TOF 10k instrument was evaluated with a gas feed containing 1-2 ppbv of various compounds.

Fast selective reagent ion (SRI) switching

With the new setup, reagent ions can be switched with times as short as 200ms, as shown below for switching the reagent ion H$_3$O$^+$ to O$_2^+$.

Mass resolution and high sensitivities

At the same time, high mass resolution and high sensitivities are achieved, as shown below for C$_8$H$_{10}$C$_6$H$_3$.H. Sensitivity: > 10,000 cps/ppbv

References