



High Resolution PTR-TOFMS: Performance Assessment and Applicability in atmospheric Sciences

M. Graus (1), M. Müller (1), A. Wisthaler (1), A. Hansel (1)

(1) Institute of Ion Physics and Applied Physics, University of Innsbruck, Austria
(martin.graus@uibk.ac.at)

Recently we developed a high resolution (HR) PTR-TOFMS. It employs proton transfer reactions (PTR), a well established chemical ionisation technique for soft ionisation, and analyses the ions by means of a novel time-of-flight mass spectrometer (TOF-MS) with compact design and high mass resolution. This combination results in a powerful analytical device for on-line trace gas analysis of particular interest for atmospheric sciences.

The high mass resolving power of the HR PTR-TOFMS ($R > 4000$; FWHM) and its dynamic range allow to assign the exact mass and isotope pattern to individual organic compounds and thus strongly improve the identification capabilities compared to a standard PTR-MS. Trace constituents of the atmosphere are identified and quantified at a time resolution of one minute and faster. Detection limits as low as few tens of pptv are obtained for a one minute integration period. Compound mixes such as acetone/glyoxal, isoprene/furan or naphthalene/octanal correspond to separate mass peaks in the spectrum and can thus be distinguished.

The performance of the HR PTR-TOFMS was assessed using a calibrated VOC gas mixture containing a suite of carbonyls, alcohols and terpenes dynamically diluted to a range of 3 to 30 ppbv. Mass peak separation capability was demonstrated by applying mixtures of trace gases taken from the head space of pure compounds as well as by the identification of compounds in out door air samples. The HR PTR-TOFMS instrument was successfully employed in smog chamber experiments at the Paul Scherrer Institute (PSI) in Villigen, Switzerland (an abstract has been submitted to the aerosol chemistry and microphysics session - AS3.02 - of the EGU General Assembly 2007).

In this paper the performance of this new instrument will be presented, first data will

be discussed.

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