

PROTON TRANSFER REACTION - MASS SPECTROMETRY

high-resolution

high-sensitivity

PTR-TOF-MS

IONICON was first to successfully commercialize the PTR-MS technology and since 1998 IONICON is the world's leading PTR-Quadrupole-MS manufacturer.

Here we report the development of a new version of PTR-MS instruments using a time-of-flight mass spectrometer, which is capable of measuring VOCs at ultra low concentrations (as low as a few pptv) under high mass resolution (as high as 5000 in the V-mode) with a mass range of beyond 100 000 amu.

The IONICON high-resolution, high-sensitivity PTR-TOF-MS was presented as prototype in 2007. Coinciding with our 10th anniversary in 2008 we launched a commercial version and are proud to show the following data.

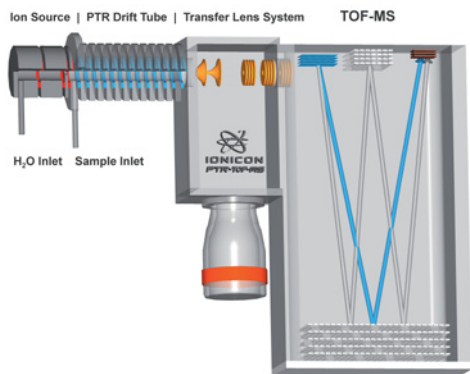


Fig.1 Schematic drawing of the PTR-TOF-MS instrument, consisting of the hollow cathode discharge ion source, the drift tube reaction chamber, the transfer lens system and the reflectron time-of-flight mass spectrometer.

The present study clearly demonstrates the great potential of the newly developed time-of-flight PTR-MS. In contrast to commercially available quadrupole PTR-MS instruments, the PTR-TOF-MS described here can generate entire mass spectra (snapshots) of complex trace gas mixtures on short response times (smaller 100 ms) with high mass resolution (in V-mode about 5000, in W-mode even higher resolutions up to 6500 but with lower sensitivity are possible) and with virtually no upper mass limit (confirmed range of over 100 000 amu). In addition the present instrument is highly sensitive (even for large masses yielding several tens of cps/ppbv) and features an extremely low detection limit (a few pptv).

These features make this novel instrument a useful and valuable tool for trace gas analysis in all kind of fields, including atmospheric and environmental science, food and flavour science, medical applications and industrial monitoring.

Experience Incredible Performance...

LoD < 10 pptv

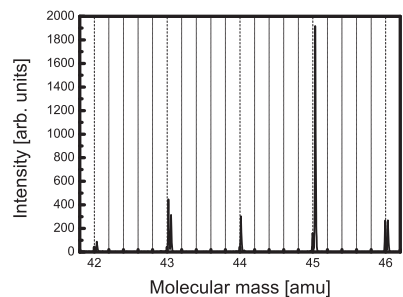


Fig. 2 PTR-TOF-MS mass spectra of an urban air sample covering the mass range between 42 and 46.

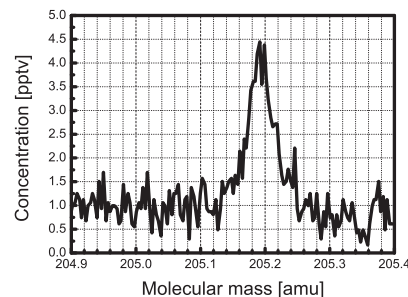


Fig. 3 PTR-TOF-MS spectrum of sesquiterpene demonstrating the extremely low detection limit and background.

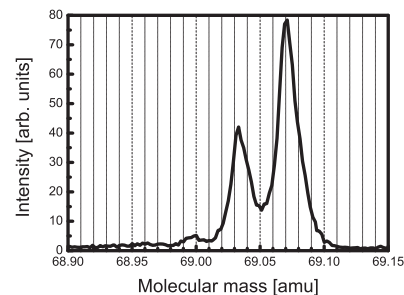
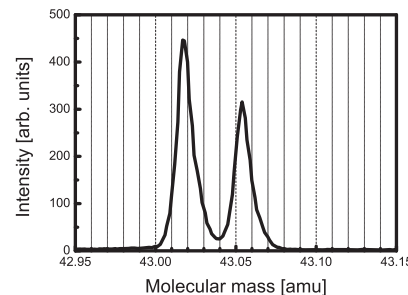


Fig. 4 Expanded views of the PTR-TOF-MS mass spectra demonstrating the ability of the present set-up to distinguish multiple mass peaks present at one nominal mass, i.e., for mass 43 protonated ketene at 43.0184 and protonated propene at 43.0548, for nominal mass 69 protonated furan at 69.034 and isoprene at 69.0704 (with a small unidentified species at around 69.000).



IONICON
ANALYTIK

THE SOLUTION FOR ONLINE TRACE GAS ANALYSIS

and get Extraordinary Results...

In order to demonstrate the performance and some of the specific advantages of the presently available IONICON PTR-TOF-MS, i.e. high mass resolution, high sensitivity, ultra-low detection limit, we have carried out measurement of the urban air just outside of our laboratory in Austria.

Fig. 5+6 Temporal variations of VOCs present in urban air measured with PTR-TOF-MS over a three days period, starting on Saturday, January 18, 2008 at around noon and lasting until Tuesday, January 21, 2008 evening.

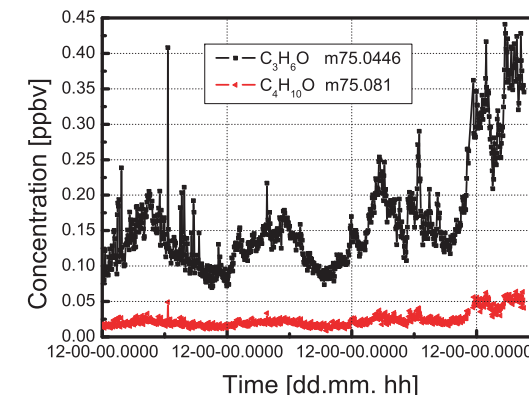


Fig. 5 C₃H₆O; likely acetic acid methyl ester and formic acid ethyl ester at 75.0446 and C₄H₁₀O; likely dimethylethanol at 75.081

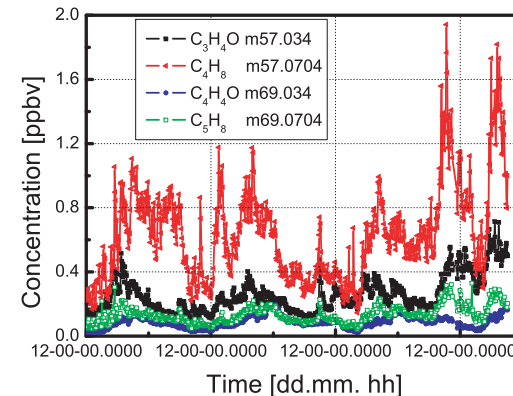


Fig. 6 Methylketene at 57.034, butene at 57.0704, furan at 69.034 and isoprene at 69.0704