



Ambient VOC-Measurements by GC-PTR-TOF

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During the past 16 years PTR-MS (Proton Transfer Reaction-Mass Spectrometry) became a well established technique for real time measurements of environmentally important VOCs (Volatile Organic Compounds) [HANSEL 1995]. The recent development of PTR-TOF (Proton Transfer Reaction-Time Of Flight) [GRAUS 2010] increased the VOC separation capability by strongly improving the mass separation capability and the duty cycle. Now isobaric compounds can be separated and whole mass spectra are recorded within a fraction of a second. Isomeric VOCs, however, remain undistinguishable with this technique.

Therefore we coupled a TDS-GC (Thermo Desorption System-Gas Chromatograph) with isomeric separation capabilities and a PTR-TOF. The performance of this new GC-PTR-TOF instrument was evaluated analysing ambient air for several days.

The measurement cycle started with simultaneous GC-sampling and direct PTR-TOF measurements of ambient air. After the fifteen minute TDS cycle, the output of the GC column was directed to the PTR-TOF and the timely separated VOC peaks were recorded for 40 minutes.

We will present first results which look very promising, e.g. different monoterpene isomers can be clearly distinguished and identified at ambient concentration levels. Additionally we show a quantitative intercomparison with the PTR-TOF standalone signal during GC sampling in a continuous three-day ambient air measurement. Furthermore we extend this isomeric separation capability to all the other collected ambient air compounds and also present their distinctive exact mass fragmentation patterns.