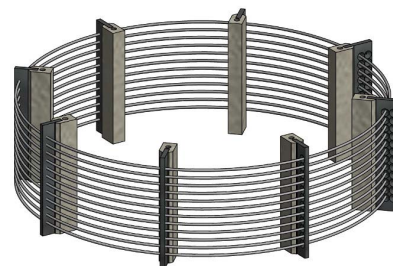
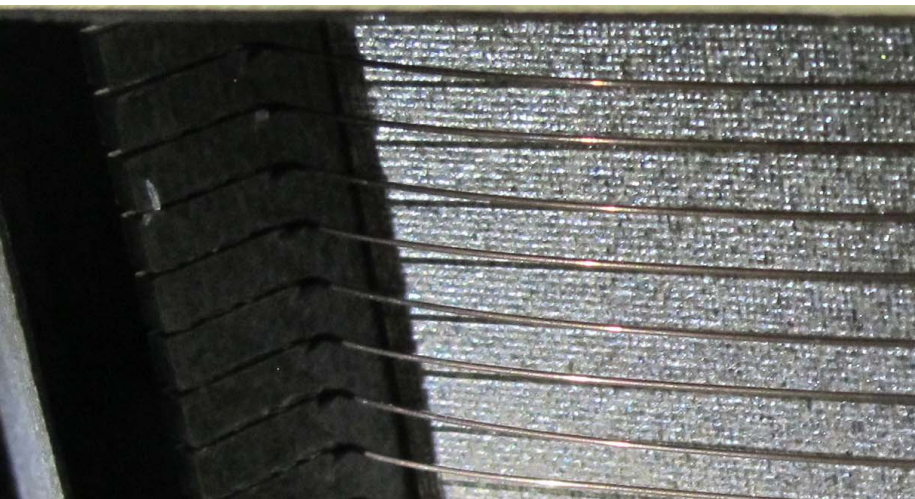


FAST GC



CHEMICAL PRE-SEPARATION for

>> PTR-TOFMS SERIES

The integration of the new fastGC into the IONICON PTR-TOFMS series adds another dimension for enhanced compound separation and identification. The setup allows fast spectral runs for near real-time measurements.

The high mass-resolution of IONICON's PTR-TOFMS series is now complemented by an optional fast gas chromatographic pre-separation step. This fastGC add-on augments the data with another dimension of chemical information, allowing to separate isomeric compounds, while maintaining fast spectral runs. In a gas chromatographic (GC) column, compounds are separated in retention time according to their chemical properties. In contrast to classical GC, spectral runs in less than one minute are possible with the fastGC module, providing near real-time data.

The fastGC mode can be activated when required while not affecting the regular PTR-TOF operation otherwise. Another advantage is the elimination of influence from high concentrations of matrix compounds, e.g. ethanol in beverages. Studies of fragmentation and interferences are also possible with the new fastGC add-on.

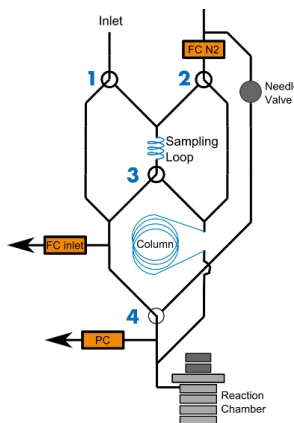
- > GC pre-separation for PTR-TOFMS
- > Identification of isomers
- > Fast spectral GC runs < 1 minute
- > Switching between fastGC and real-time

Find out more:

www.ionicon.com/fastgc

fastGC SETUP

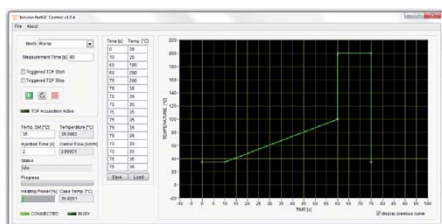
The fastGC module consists of the heated column, a sample loop, several valves (1-4), and an additional flow controller. The valves can configure different operation modes: sample loop loading and injection, and subsequent fastGC measurement. Most importantly, the PTR-TOF can operate in its normal real-time measurement mode, not affected by the fastGC.



What makes the fastGC FAST?

The duration of a GC analysis is limited by the last compound eluting the column. This can be sped up by heating the column. In conventional GC systems, with typically heating ramp speeds of 30°C/min., this results in run-times of several ten minutes. Moreover, also the cooling rates for a whole oven are comparably slow, which extends the time until the next run can be initiated.

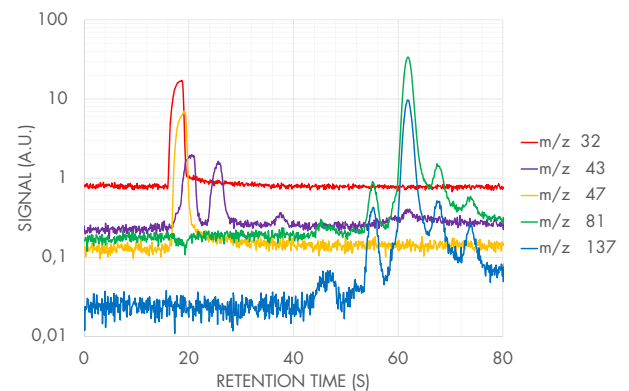
IONICON's fastGC system uses shorter columns of only a few meters. The key to fast spectral runs, however, is the innovative heating system: the metallic column is resistively heated, keeping the thermal mass at a minimum. This allows for fast heating AND equally fast cooling rates of 1800°C/min., enabling spectral runs in < 1 min.



With the fully integrated fastGC software, the user can start fastGC runs and conveniently control temperature ramps.

fastGC ADVANTAGES

The benefits of a fastGC-PTR-TOF can be demonstrated performing headspace analysis of a shandy drink - a 50:50 mixture of beer and lemonade. Selected traces are shown in the figure below. Oxygen elutes from the column without retention. This is indicated by the O₂⁺ signal (m/z 32), which serves as a reference.



Separation of isomers: Terpenes are a diverse class of VOCs. They are key compounds in environmental and biological studies and are also important in food and flavor science. The trace at m/z 137 shows a multitude of nicely separated monoterpenes that would not be distinguishable without GC pre-separation. Only one of them being limonene, which is likely to be found in lemonade.

Fragmentation: The fastGC also allows a closer inspection of fragmentation ratios using the real sample, without the necessity to revert to analyzing pure compounds. In a fastGC spectrum, the fragment ions coincide at identical retention times, see m/z 81, a known fragment of monoterpenes. Thus, fragments and their ratios can easily be determined.

Separation of matrix compounds: The fastGC has another advantage in situations where the sample matrix contains compounds in high concentrations. For example, the high ethanol concentration in the headspace of alcoholic beverages can lead to a problematic depletion of the primary ion yield. Using the fastGC, ethanol (m/z 47) elutes shortly after sample injection and rapidly decays to background levels, making subsequent detection of VOCs unproblematic.

■ Reference:

Romano et al., Int. J. Mass Spectrom. (2014), doi:10.1016/j.ijms.2014.06.006