

TECHNICAL NOTE

Increase Throughput with *FAST Enabled*[™] Micro GC Fusion[®] Gas Analyzer

OVERVIEW

This technical note describes the advantages of using *FAST Enabled* Micro GC Fusion Gas Analyzer for fast, accurate, and sensitive measurements of gas components containing low ppm to high percentages in a single analysis. Combining the analysis into a single run reduces analysis time and increases sample throughput.

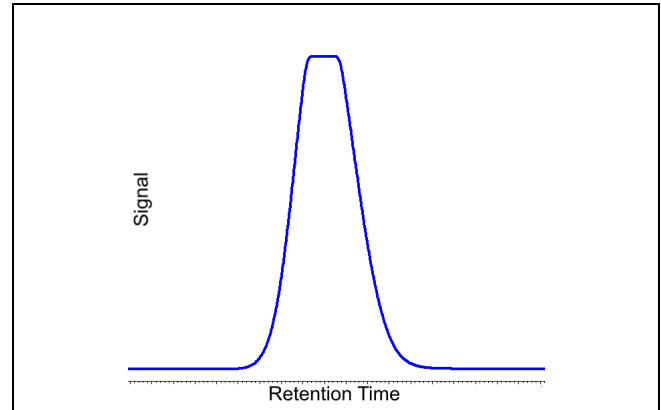
INTRODUCTION

Thermal conductivity detectors (TCDs) are universal detectors capable of analyzing chemical components of low ppm to high percentages. Due to the variation in the concentration range of low ppm to high percentages, two sensitivity settings are often necessary for the TCD to yield accurate results. The *FAST Enabled* Micro GC Fusion solves this problem with a microelectromechanical systems (MEMS) TCD which allows for fast, accurate, and sensitive measurement of gas components that requires no change to the sensitivity setting and makes analysis more efficient.

ANALYZING LOW AND HIGH CONCENTRATIONS

Previously, the 3000 Micro GC TCD required the sensitivity setting “standard” to analyze high percentage concentration components and “high” to analyze low ppm concentration components. [Figure 1](#) illustrates an example of using the “high” sensitivity setting to analyze high percentage concentration components. This results in an undesirable capped peak that prevents accurate quantification. Using the “standard” sensitivity setting will restore the Gaussian peak shape for the high percentage components, but will sacrifice the sensitivity of the low ppm components.

Figure 1 Capped peak with “high” detector sensitivity setting



FAST Enabled solves this problem and allows both high percentage and low ppm components to be analyzed in a single run, eliminating the need for a sensitivity setting in the method. The automatic adjustment of the detector gain during a run provides fast and accurate analysis of a large concentration range of gases with excellent peak shape. (See [Figure 2](#) and [Figure 3](#).)

Figure 2 Chromatogram of high percentage and low ppm compounds in a single run

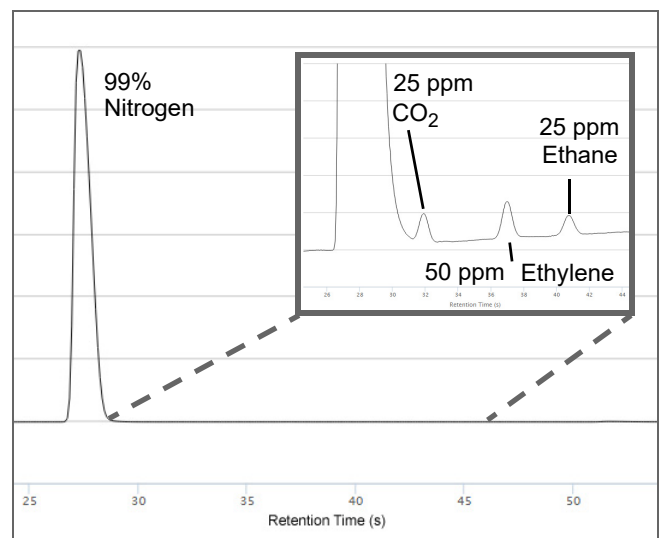
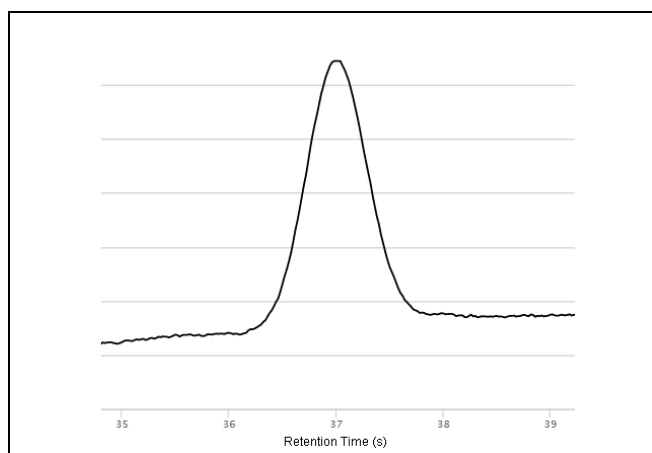


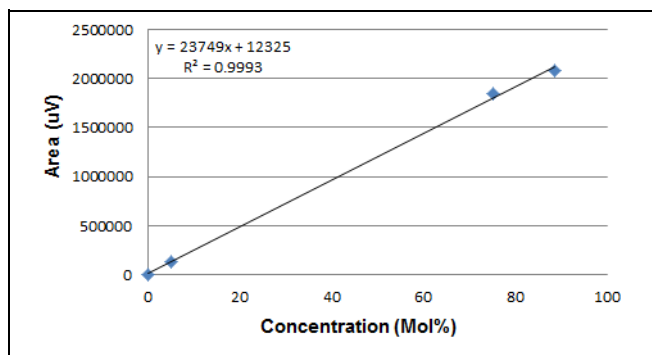
Figure 3 50 ppm ethylene peak, zoomed in



LINEARITY

Four calibration gas standards of methane concentrations ranging from 10 ppm up to 89% were analyzed on a Rt®-Q-Bond module. (See Figure 4.) The FAST Enabled Micro GC Fusion displays excellent linearity from low ppm to high percent.

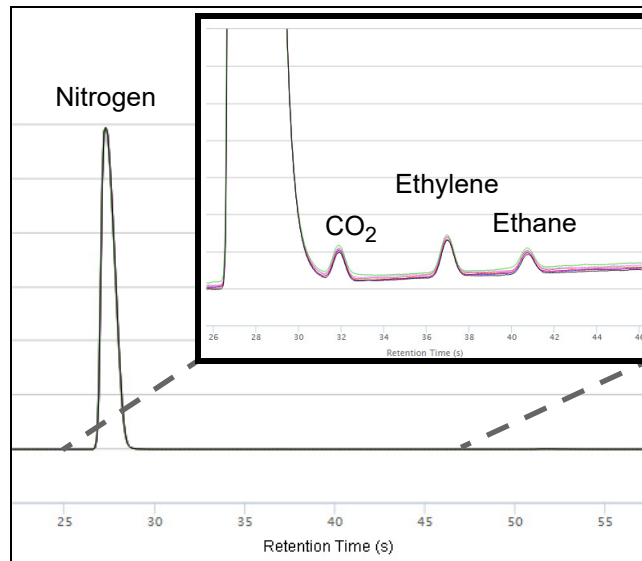
Figure 4 Linearity from low ppm to high percent methane — Rt-Q-Bond module



REPEATABILITY

Six runs of a gas standard containing ppm level hydrocarbons in a nitrogen balance were analyzed and overlaid. (See Figure 5.) The FAST Enabled Micro GC Fusion demonstrates excellent repeatability for both retention time and area. (See Table 1.)

Figure 5 Nitrogen and zoomed view of 50 ppm Ethylene and 25 ppm Ethane on a Rt-Q-Bond module



The percent relative standard deviation (%RSD) was calculated for each compound to determine instrument repeatability. At low ppm, the components of interest exhibit excellent precision for retention time and peak area. (See Table 1.)

Table 1 Peak area and retention time %RSD values

Compound	Concentration	Retention Time %RSD	Area %RSD
Nitrogen	99%	0.03	0.13
Ethylene	50 ppm	0.02	1.36
Ethane	25 ppm	0.05	2.19

CONCLUSION

The FAST Enabled Micro GC Fusion Gas Analyzer can measure a sample with component concentration spanning from a low ppm to high percentage range in a single analysis while still maintaining excellent linearity and repeatability. This simplified method development improves analysis efficiency, reduces analysis time and increases sample throughput.



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