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## Quantitation of Fenvalerate using the Griffin 450™ Mobile GC/MS/MS

### INTRODUCTION

Sensitive and selective detection, identification, and confirmation of a wide variety of chemical species has become a necessity in many applications including the quantitation of chemical warfare (CW) agents, explosives, environmental pollutants, and other toxic industrial compounds and materials (TICs/TIMs). Field-deployable sensors are preferred in many instances because valuable time, resources, and chemical information are conserved by performing analyses directly in the field rather than retrieving samples to be studied at a later time in the laboratory. Griffin's line of compact, mobile tandem mass spectrometers based on the Cylindrical Ion Trap (CIT) mass analyzer<sup>1,2</sup> has been developed to fulfill this need (see Figure 1).

Fenvalerate is an insecticide used on food crops to control a wide range of insects. Because of its potential to harm humans and other animal species, fenvalerate residue on food crops is monitored by food regulation agencies worldwide. This application note shows the quantitation of fenvalerate using the Griffin 450 mobile GC/MS/MS instrument (the Griffin 400™ may also be used to perform this analysis).

### INSTRUMENTATION

- Griffin 450 GC/MS system
- Griffin System Software - GSS 3.2

### Gas Chromatograph and Conditions:

Temperature Program: 50° C hold for 2 min, then increase at 25° C per minute to 300° C, hold for 6 min	
Column:	Rtx-5ms, 30m X 0.25mm X 0.25µm
Carrier Gas:	1 mL/minute helium
Sample:	Fenvalerate (Sigma-Aldrich, PESTANAL®, analytical standard) in cyclohexane

### Mass Spec Conditions:

ALC enabled with maximum ionization time at 150 ms.	
Mass Scan Range:	m/z 50-425
Detector Temp:	150° C
Injector Temp:	210° C
Quantitation Ion:	m/z 167

Figure 1. The Griffin 450 - Mobile GC/MS/MS



## RESULTS AND DISCUSSION

Figure 2 shows the chromatograph of fenvalerate. Two peaks are observed with a retention time of 14.92 min and 15.03 min respectively because of the existence of R, S isomers of fenvalerate.

Figure 3 shows the mass spectrum of fenvalerate (top) along with NIST library spectrum of fenvalerate (bottom). Fenvalerate was identified as the top match when searching against NIST library.

Figure 4 shows the calibration curve of fenvalerate in the range of 10 ng to 100 ng with m/z 167 as the quant ion. The  $R^2$  for the linear curve is 0.9978 over this range.

## CONCLUSIONS

Griffin's compact tandem mass spectrometers are field-deployable and can be used as the analyzer for a number of different applications, including pesticide analysis. In this note, a widely used insecticide, fenvalerate, was analyzed using the Griffin 450 mobile GC/MS/MS system.

These data represent typical results.

## REFERENCES

- (1) Wells, J.M.; Badman, E.R.; Cooks, R.G. *Anal. Chem.* 1998, 70, 438-444.
- (2) Patterson, G.E.; Guymon, A.J.; Riter, L.S.; Everly, M.; Griep-Raming, J.; Laughlin, B.C.; Ouyang, Z.; Cooks, R.G. *Anal. Chem.* 2002, 74, 6145-6153.

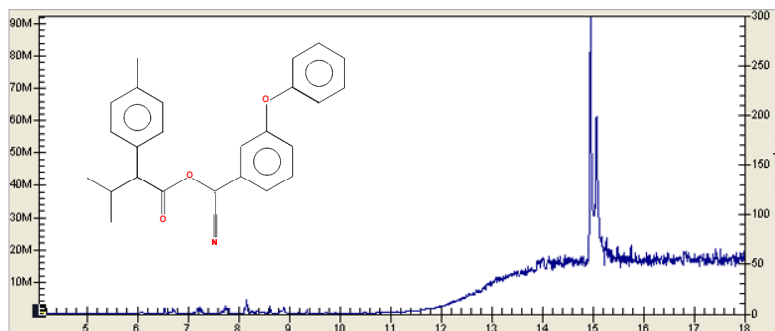


Figure 2. Chromatogram of fenvalerate (100 ng/ $\mu$ l concentration).

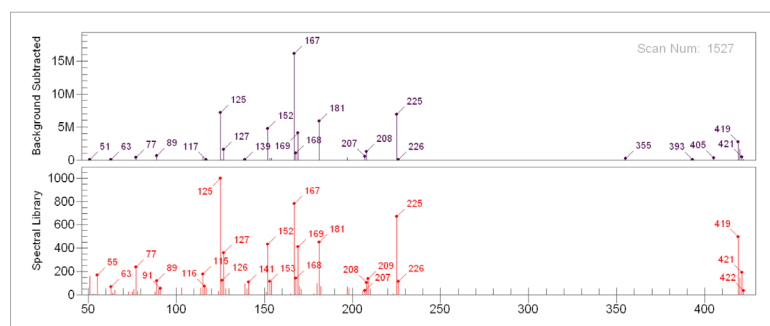


Figure 3. Comparison of mass spectra of fenvalerate from Griffin 450 (top) and NIST library (bottom).

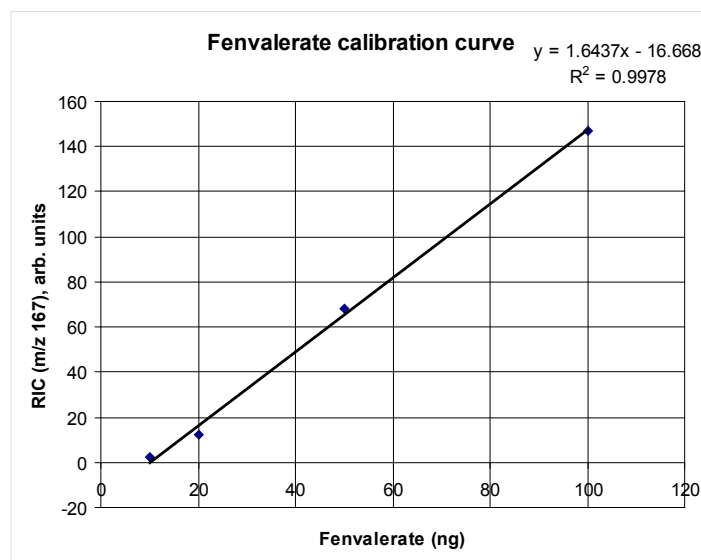


Figure 4. Calibration curve of fenvalerate.