

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 agents (CWAs), explosives, environmental pollutants and other toxic industrial compounds and materials (TICs/TIMs). In many instances, field-deployable sensors are preferred 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. The ICx line of compact, mobile tandem mass spectrometers based on the Cylindrical Ion Trap (CIT) mass analyzer^{1, 2} has been developed to fulfill this need.

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. The Griffin™ 400 may also be used to perform this analysis.

INSTRUMENTATION

- Griffin 450
- Griffin System Software

Gas Chromatograph and Conditions

Temperature Program: 50°C hold for 2 min, and then increase at 25°C/minute to 300°C. Hold for 6 minutes.	
Column	RTX-5 ms, 30 m x 0.25 mm x 0.25 µm
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 Temperature	150°C
Injector Temperature	210°C
Quantitation Ion	m/z 167

RESULTS AND DISCUSSION

Figure 1 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.

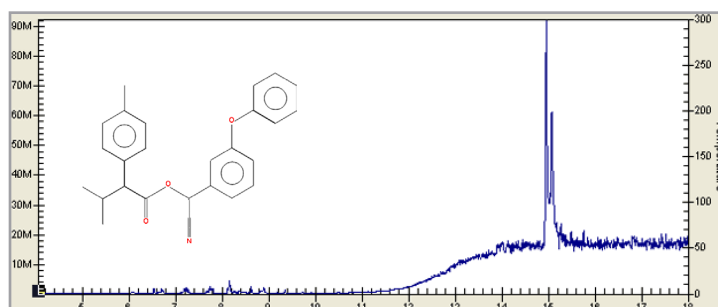


Figure 1: Chromatograph of fenvalerate (100 ng/µl concentration)

Figure 2 shows the mass spectrum of fenvalerate along with NIST library spectrum of fenvalerate. Fenvalerate was identified as the top match when searching against NIST library.

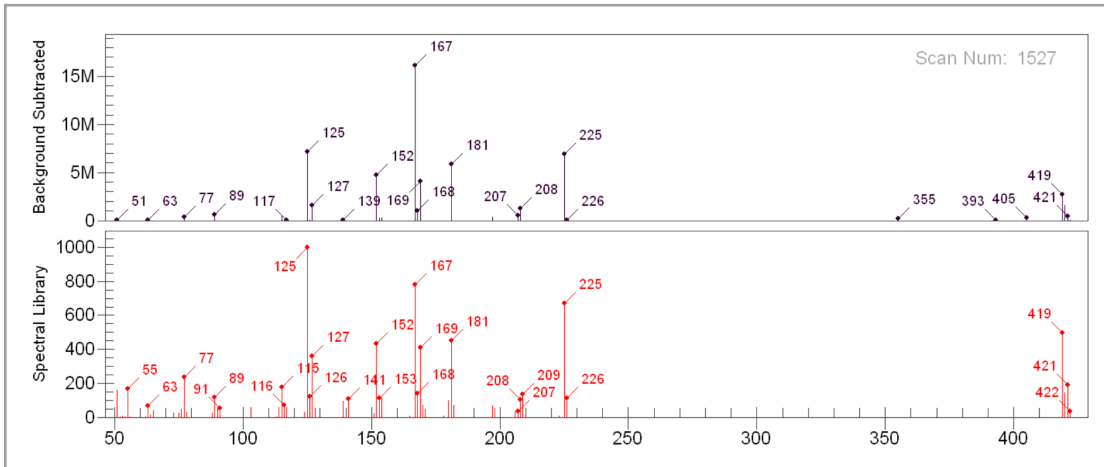


Figure 2: Comparison of mass spectra of fenvalerate from Griffin 450 and NIST library

Figure 3 shows the calibration curve of fenvalerate in the range of 10 ng to 100 ng with m/z 167 as the quant ion. The R² for the linear curve is 0.9978 over this range.

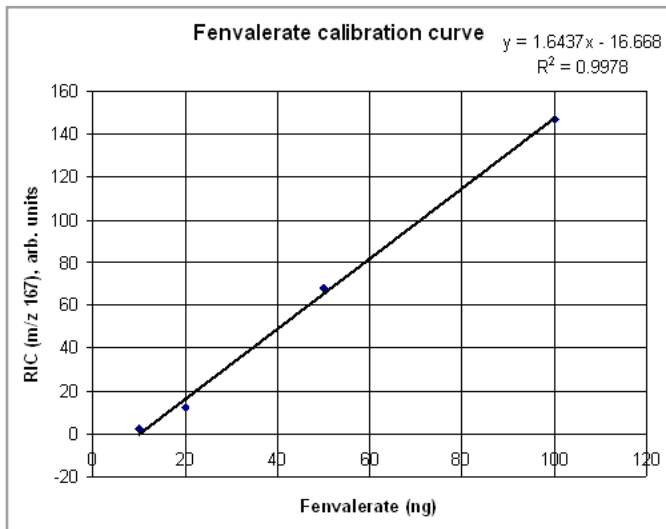


Figure 3: Calibration curve of fenvalerate

CONCLUSIONS

The ICx 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.

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.

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