

# Evolution GC-MS/MS

Transforming the best GC-MS system  
into something even better:

DRUGS

RESIDUES

DIOXINES

FORENSIC



Application Note Evo802

## Easy Pesticide Determination at 0.01 mg/kg Level by MS/MS

### INTRODUCTION

A huge number of different pesticides is being regularly applied in the agricultural industry, including insecticides, fungicides, herbicides, and growth regulators. Due to their different physicochemical behavior not all of them but to date around 300 are amenable to the GC/MS/MS technique.

The inherent superior selectivity of this technique allows for interference-free

quantification, even with coeluting compounds, as well as positive confirmation of various pesticides in a single analytical run. To precisely monitor pesticide residues, a high throughput multi-residue screening method that can quantitate a large number of pesticide residues during a single analytical run is essential.

This application note shows the matchless capabilities of the MRM technique using the **CHROMTECH EVOLUTION MS/MS** triple quadrupole mass spectrometer for multi-pesticides residue determination. The analyzed sample is a spiked lettuce matrix.

**METHODS****Extraction Method**Pesticide mix used for spiking:

Dichlorvos,	RT 5.64 min
Mevinphos,	RT 7.43 min
Propham,	RT 7.66 min
Heptenophos,	RT 8.69 min
Trifluralin,	RT 9.53 min

Concentration for each compound: 0.06 mg/L (equals 0.01mg/kg in real sample)

Sample preparation was performed as follows:

1. Homogenization using a Ultra-Turrax blender
2. Online-SFE with cyclohexane/ethylacetate 1:1
3. Gel permeation chromatography
4. Analysis of the extract by GC/MS/MS (MRM)

**GC Method**

Agilent 6850N GC with Agilent 6850 series autosampler

Column: HP-5ms, 30m x 0.25 mm ID x

0.25  $\mu$ m

Carrier gas: Helium, 24 psi, constant pressure

Oven Program: 70 °C, hold 2 min, 200°C @ 15°C/min, hold 3.67 min

Inlet: 250°C, 1.5 min splitless, 1  $\mu$ L injected

**MS Method**

CHROMTECH EVOLUTION GC/MS/MS triple quadrupole mass spectrometer

Agilent ChemStation E.01.01+ Evodriver SW 2.04

Ionization Mode: Electron ionization (EI)

Solvent delay: 4.5 min

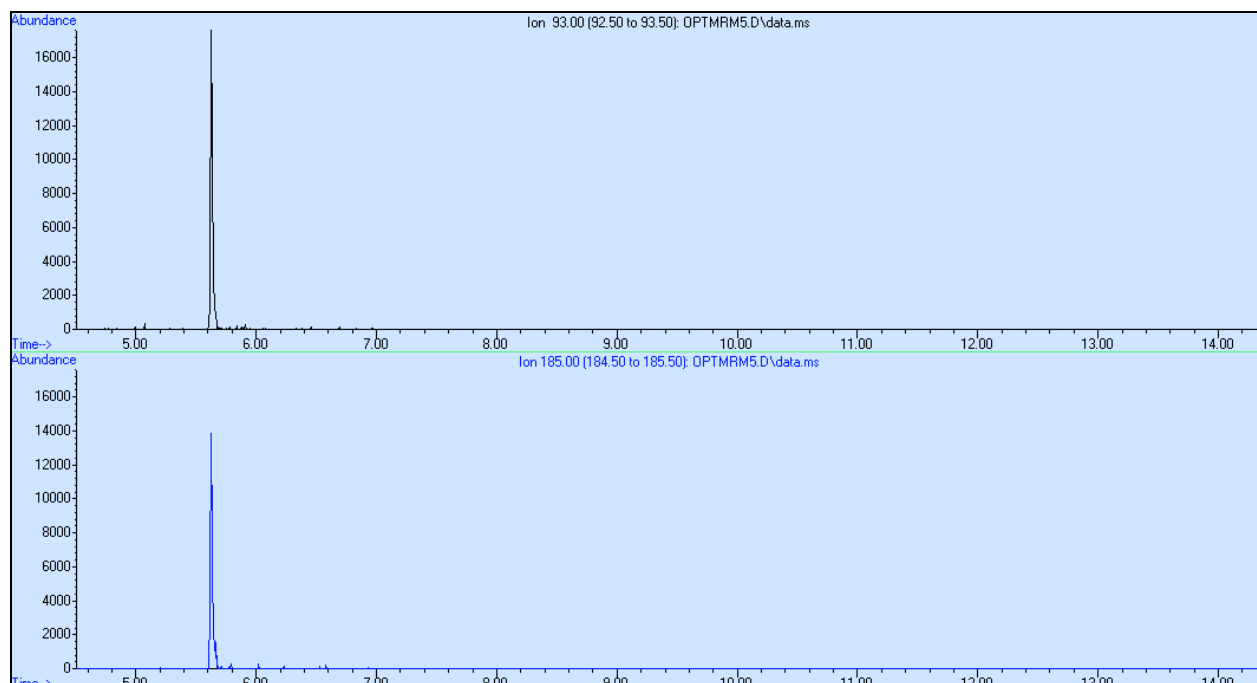
Electron energy: 70eV

Ion source temp.: 230 °C

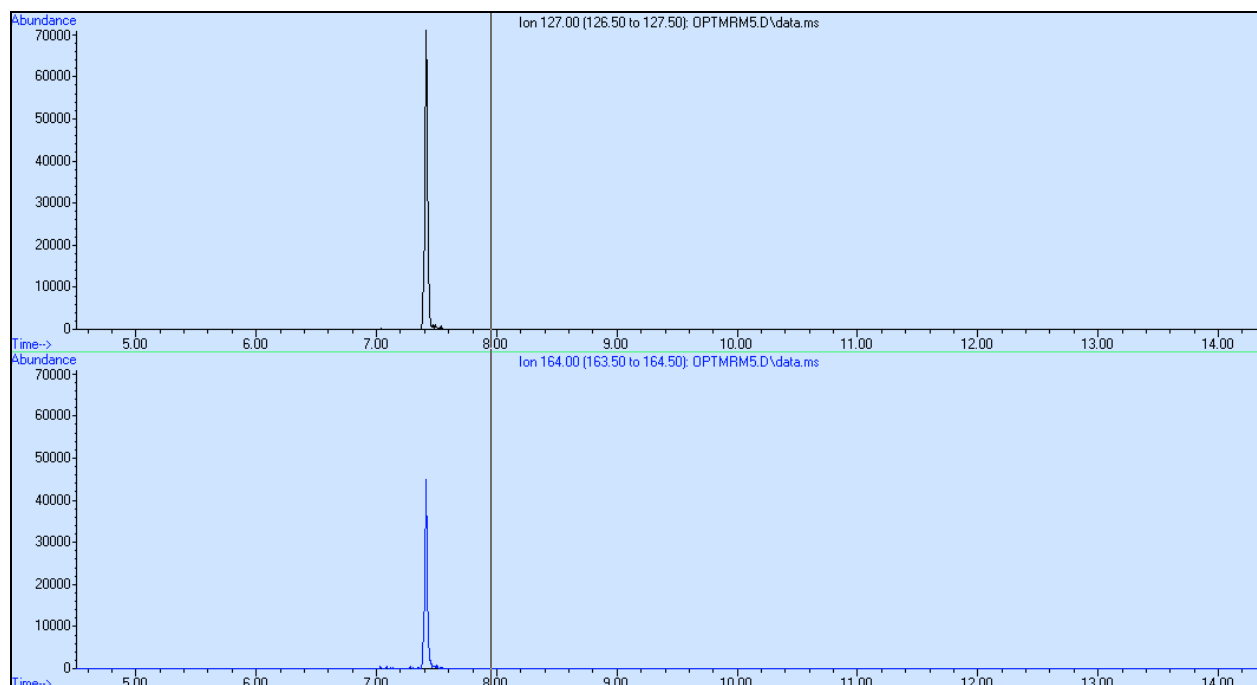
Quadrupole temp.: 150°C

MRM mode:	1 Group with 2 MRM transitions for each compound:		
Compound	Q1 mass	Q3 mass	Collision Energy (V)
Dichlorvos	185	93	-12V
	220	185	- 6 V
Mevinphos	192	127	-12 V
	192	164	-6 V
Propham	179	137	- 6 V
	179	120	-9 V
Heptenophos	250	124	-9 V
	250	215	- 6 V
Trifluralin	306	264	-6 V
	306	160	-21 V

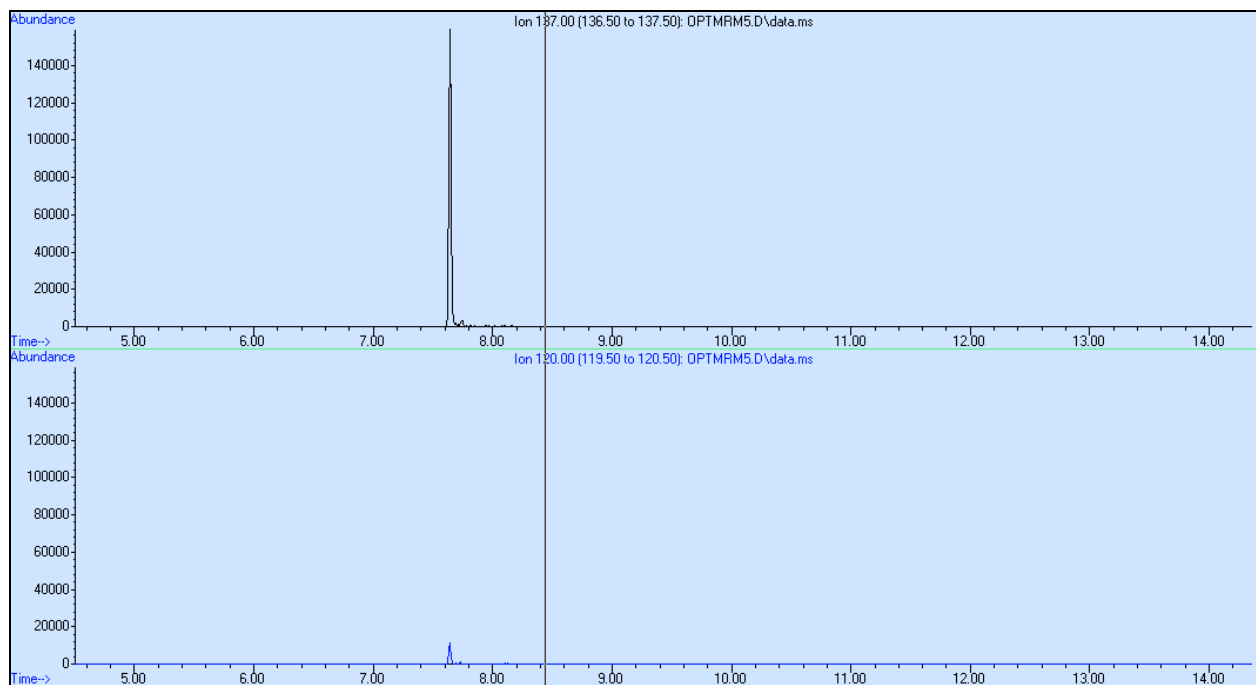
Scan Time: 0.2  
Resolution Q1.1.5 / Q3: 1.5  
Collision gas pressure (Argon)@Aux EPC channel: 1 bar



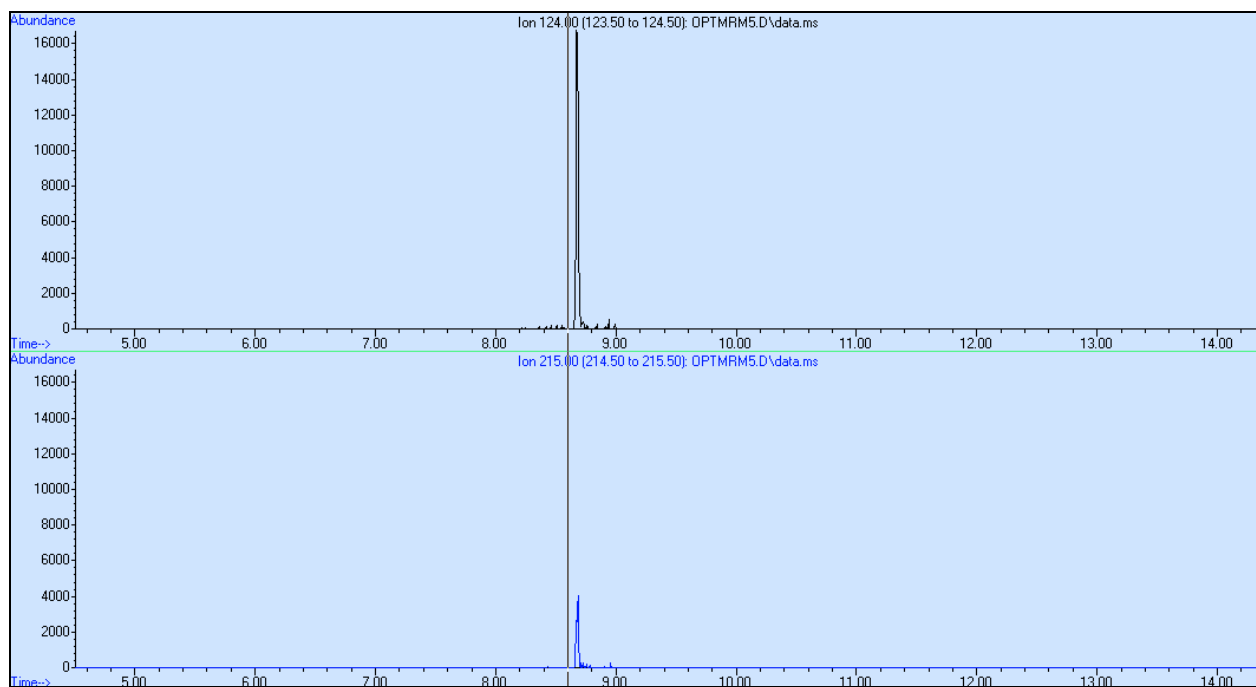
**Figure 1:** Dichlorvos, RT 5.64 min, MRM, m/z 185>93@-12V, m/z 220>185@-6V



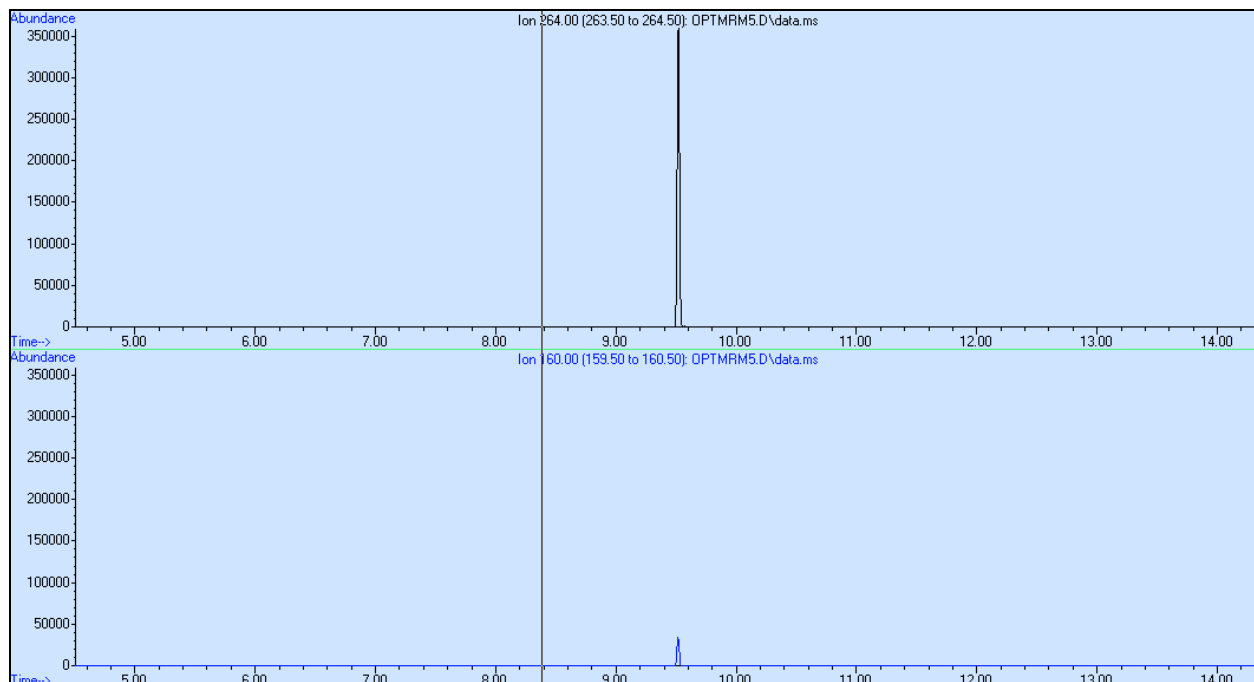
**Figure 2:** Mevinphos, RT 7.43 min, MRM, m/z 192>127@-12V, m/z 192>164@-6V



**Figure 3:** Propham, RT 7.66 min, MRM, m/z 179>137@-6V, m/z 179>120@-9V



**Figure 4:** Heptenophos, RT 8.69 min, MRM, m/z 250>124@-6V, m/z 250>215@-6V



**Figure 5:** Trifluralin, RT 9.53 min, MRM, m/z 306>264@-9V, m/z 306>160@-21V

## CONCLUSIONS

MRM is the method of choice when it comes to the determination of low limit concentration of pesticide residues in complex (“heavy”) matrix since it offers significant improvements in the signal/noise ratio due to the matrix elimination effect of the MRM.

