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Application Note SI-01346

High-Throughput Analysis of Pesticides using Large Volume Injection and VF Rapid-MS Techniques

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Introduction

The Rapid-MS and large volume injection techniques can be combined to create a powerful analytical tool to produce a fast analysis of a wide array of pesticides at extremely low detection levels. The VF Rapid-MS pesticide column works with a pre-column restrictor in front of a 0.53 mm ID FactorFour™ column. The combined restrictor and MS vacuum allow the analytical column to operate at very high carrier gas velocities without loss of column efficiency or resolution.

This Rapid MS technique typically reduces the time of analysis by a factor 4–5 compared to the more classical approach using 30 m x 0.25 mm columns. For this analysis, the last compound of interest, PCB 180, elutes within only 12 minutes. The fast elution pattern also increases sensitivity and reduces detection limits at the same time. The MS vacuum causes compound elution temperatures to be much lower resulting in reduced column bleed formation and thus, improved signal to noise ratios. The Varian 240 Ion-trap MS/MS capabilities further enhance sensitivity and compound identification accuracy for this pesticides/PCB analysis.

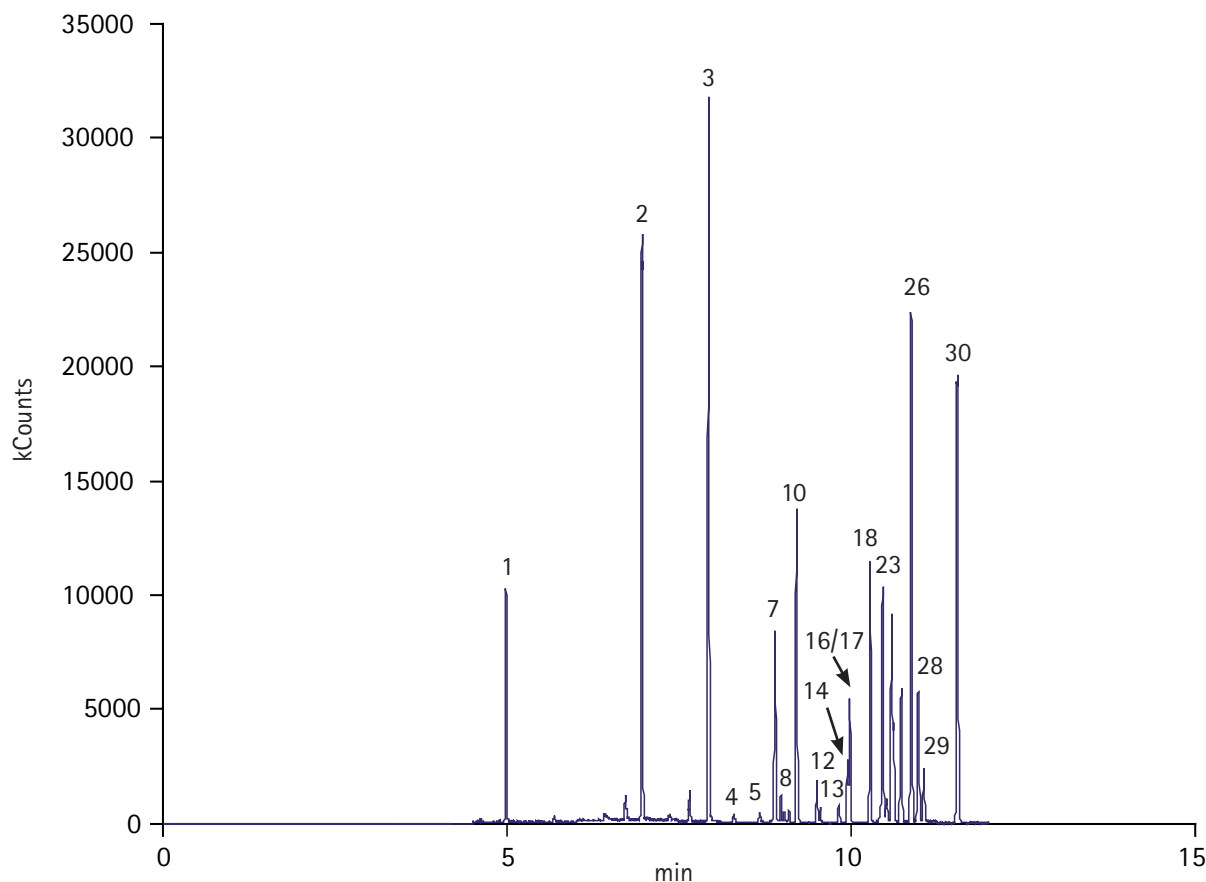


Figure 1. This chromatogram shows how Rapid-MS and large volume injection techniques combine fast analysis with extremely low detection levels.

Conditions

Column: VF Rapid-MS pesticide column (pn: CP8138) with a 2.5 m x 0.53 mm retention gap

Injection Volume: 50 µL large volume injection (LVI)

Sample Concentration: 0.8 ppb of pesticide and PCB standards

Injection Speed: 5 µL/s

Liner: Carbofrit liner

Column Oven: 40 °C (3.00 min) -> 20 °C/min -> 250 °C (0 min)

Injector Type: 1079

Injector Temperature: 65 °C (0.50 min) -> 200 °C/min -> 350 °C (5 min)

Time	Split Ratio
Initial	1:25
0.45 m	Off
2.10 m	1:50

Peak Identification

Peak	RT	Peak Name
1	4.99	hexachlorobutadiene
2	6.96	penatchlorobenzene
3	7.93	hexachlorobenzene
4	8.30	a-HCH
5	8.67	b-HCH
6	8.88	c-HCH
7	8.90	PCB28
8	8.98	heptachlor
9	9.02	d-HCH
10	9.20	PCB52
11	9.22	aldrin
12	9.51	telodrin
13	9.55	isodrin
14	9.94	o,p'-DDE
15	9.95	cis-heptachlor epoxide
16	9.98	PCB101
17	9.99	trans-heptachlor epoxide
18	10.28	p,p'-DDE
19	10.28	alfa-endosulfan
20	10.46	o,p'-DDD
21	10.62	o,p'-DDT
22	10.52	dieldrin
23	10.59	PCB118
24	10.71	endrin
25	10.73	PCB138
26	10.87	p,p'-DDD
27	10.97	beta-endosulfan
28	10.98	PCB153
29	11.06	p,p'-DDT
30	11.54	PCB180

These data represent typical results.

For further information, contact your local Varian Sales Office.

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