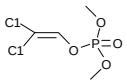
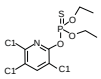
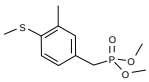
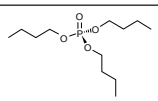
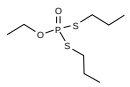
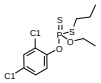
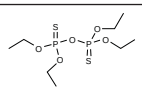
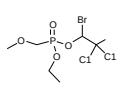
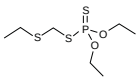
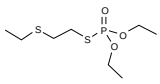
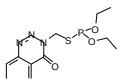
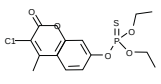
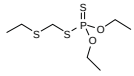
Organophosphorous pesticides USEPA 8141 method

Introduction

The use of the exceptionally inert and thermally stable BPX5 (5% phenyl equivalent), BPX35 (35% phenyl equivalent) and BPX50 (50% phenyl equivalent) capillary columns for the analysis of organophosphorous pesticides has solved all the problems associated with the chromatography of this class of compounds.

Organophosphorous pesticide analysis can be difficult and time consuming. High temperatures are usually required for the chromatography of many pesticides, causing problems with the bleed profile of the column and contaminants being left behind. Sample throughput and hence laboratory efficiency are further reduced by long analysis times – often up to 40 minutes. BPX5, BPX35 and BPX50 columns can analyze the USEPA 8141 mix (Table 1) in less than 22 minutes allowing a higher throughput of samples. The baseline resolution of the organophosphorous pesticides is excellent on BPX5, BPX35 and BPX50 with the bleed profile a strong feature at temperatures up to 360°C. The high thermal stability of the phase for each of these columns allows the analyst to "bake out" any high boiling contaminants to 360°C without damaging the stationary phase. This insures against the possibility of any interference from these contaminants with further analyses. BPX5, BPX35 and BPX50 columns show outstanding inertness with even the most difficult

Table 1. OPP structures

Compound	Structure	Compound	Structure
4-chloro-3-nitrobenzotrifluoride		Methyl Parathion	
Dichlorvos		Ronnel	
2-Bromonitro-benzene		Chlorpyrifos	
α–Mevinophos		Fenthion	
Tributyl Phosphate		Trichlorinate	
Ethoprop		Tokuthion	
Sulfotepp		Tetrachlorvinphos	
Naled		Fensulfothion	
Phorate		Triphenyl Phosphate	
O-Demeton		Guthion	
Diazinon		Coumaphos	
Disulfoton			

of organophosphorous compounds, Naled, which readily breaks down to Dichlorvos on column and is easily detected without any apparent decomposition. This analysis has been performed on columns with dimensions of 30 m x 0.25 mm x 0.25 µm which is a standard dimension column in most laboratories. There are no coelutions on any of these columns making BPX5, BPX35 and BPX50 the ideal column of choice for organophosphorous pesticide analysis.

Table 1 shows the structure of the relevant organphosphorous pesticides analyzed on BPX5, BPX35 and BPX50.

BPX5

5% phenyl (equiv) polysilphenylene-siloxane

Figure 1 shows the USEPA 8141 mix analyzed on a BPX5 column. Note the excellent separation of the components in less than 20 minutes allowing higher sample throughput. Also note the excellent bleed profile at 300°C.

BPX5 replaces			
DB-5	Rtx-5ms	HP5-TA	Rtx-5Sil MS
DB-5MS	Ultra-2	SPB-5	AT-5
DB-5.625	HP-5	MDN-5S	CP-Sil 8CB M
XTI-5	HP-5MS	CP-Sil 8CB	

Column part number	054101		
Phase	BPX5	Constant flow	On
Column	30m x 0.25 mm x 0.25 µm	Average linear velocity	42 cm/sec at 50°C
Sample	10 ng/mL in dichloromethane	Injection mode	Splitless
Initial temperature	50°C, 1 min	Injection volume	1 µL
Rate 1	30°C/min to 190°C, 3 min	Injection temperature	250°C
Rate 2	10°C/min to 300°C	Purge on time	0.5 min
Final temperature	300°C, 5 min	Purge on (split) vent flow	60 mL/min
Detector	MS	Autosampler	No
Carrier gas	He, 10.8 psi	Liner type	4 mm ID Double taper liner
Carrier gas flow	1.3 mL/min		

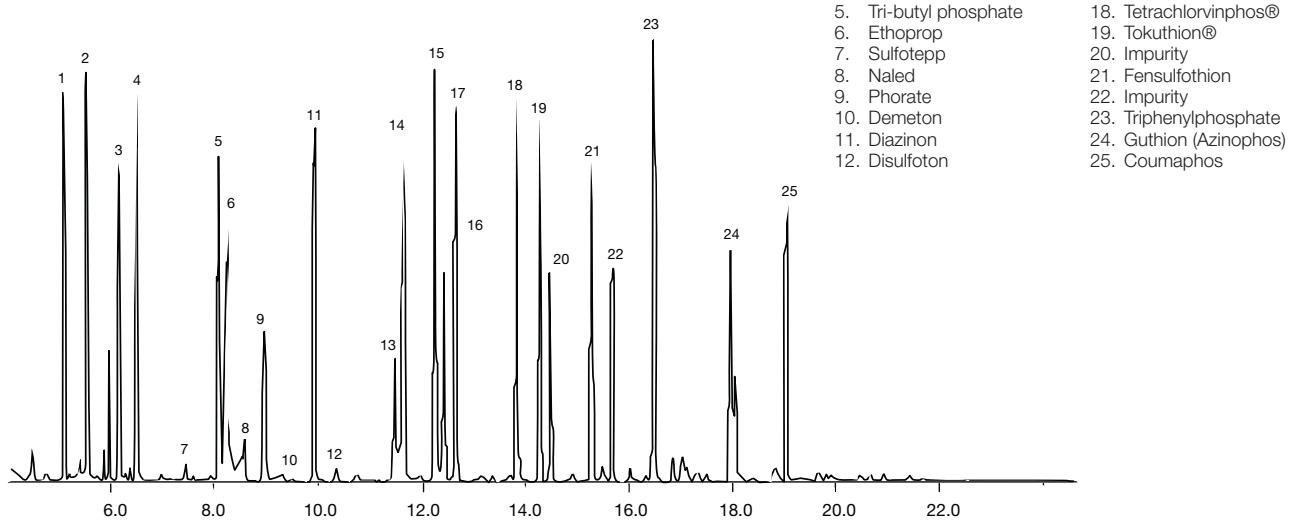


Figure 1

BPX35

35% phenyl (equiv) polysilphenylene-siloxane

Figure 2 shows the USEPA 8141 mix analyzed on a BPX35 column. The BPX35 is a great confirmation column for both BPX5 and BPX50 with there being two changes in elution order. Also note the superior bleed profile at 300°C.

BPX35 replaces	
DB-35	HP-35MS
DB-35MS	SPB-35
Rtx-35	MDN-35
Rtx-35ms	AT-35
HP-35	

Column part number	054701		
Phase	BPX35	Constant flow	On
Column	30 m x 0.25 mm x 0.25 µm	Average linear velocity	42 cm/sec at 50°C
Sample	10 ng/mL in dichloromethane	Injection mode	Splitless
Initial temperature	50°C, 1 min	Injection volume	1 µL
Rate 1	30°C to 190°C, 3 min	Injection temperature	250°C
Rate 2	10°C to 300°C	Purge on time	0.5 min
Final temperature	300°C, 5 min	Purge on (split) vent flow	60 mL/min
Detector	MS	Autosampler	No
Carrier gas	He, 10.8 psi	Liner type	4 mm ID Double taper liner
Carrier gas flow	1.3 mL/min		

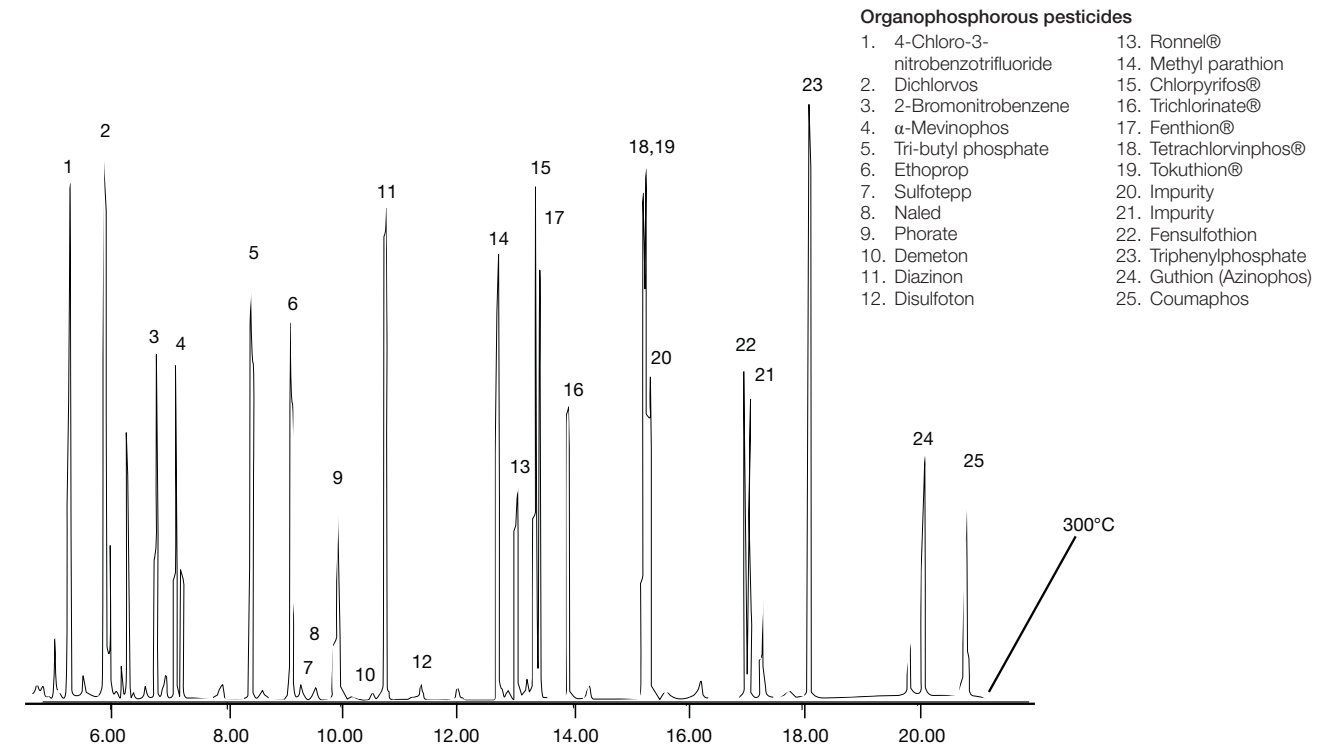


Figure 2

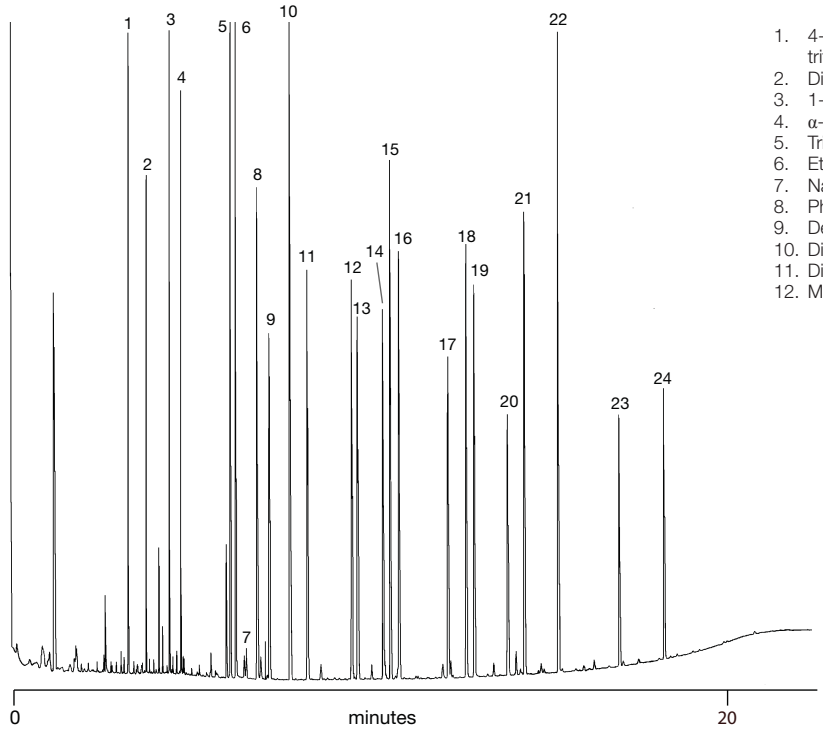
BPX50

50% phenyl (equiv) polysilphenylene-siloxane

Figure 3 shows the separation of the USEPA 8141 mix analyzed on a BPX50 column. Note the excellent peak shape and separation of each component.

BPX50 replaces	
OV-17	SPB-50
SP-2250	HP-50+
DB-17	HP-17
DB-17MS	AT-50
DB-17ht	007-17
Rtx-50	

Column part number	054751		
Phase	BPX50, 0.25 µm film	Constant flow	On
Column	30 m x 0.25 mm x 0.25 µm	Average linear velocity	30 cm/sec at 50°C
Sample	10 ng/µL organophosphorous pesticides	Injection mode	Splitless
Initial temperature	50°C , 1 min	Injection volume	1 µL
Rate 1	30°C/min to 200°C, 3 min	Injection temperature	240°C
Rate 2	10°C/min to 310°C, 2 min	Purge on time	0.5 min
Final temperature	310°C, 2 min	Purge on (split) vent flow	60 mL/min
Detector	FID, 320°C	Autosampler	Yes
Carrier gas	He, 14.4 psi	Liner type	4 mm ID FocusLiner with single taper
Carrier gas flow	1.30 mL/min		



1. 4-chloro-3-nitrobenzo trifluoride
2. Dichlorvos
3. 1-Bromo-2-nitrobenzene
4. α-mervinphos
5. Tributyl phosphate (IS)
6. Ethoprop
7. Naled
8. Phorate
9. Demeton
10. Diazinon
11. Disulfoton
12. Methyl Parathion
13. Ronnel®
14. Chlorpyrifos®
15. Fenthion®
16. Trichlorinate®
17. Tetrachlorvinphos®
18. Tokuthion®
19. Impurity
20. Fensulfothion
21. Impurity
22. Triphenyl phosphate (IS)
23. Guthion
24. Coumaphos

Figure 3

Summary

BPX5, BPX35 and BPX50 columns show unparalleled performance for the separation of the phosphorated pesticides listed in the USEPA 8141 method. They can be conditioned at the end of each analysis to remove any high boiling point contaminants without any degradation to the stationary phase and give excellent response and very little on column breakdown. BPX5, BPX35 and BPX50 are the columns of choice for all organophosphorous pesticide analyses.

Information and support

Visit www.trajanscimed.com or contact techsupport@trajanscimed.com

Specifications are subject to change without notice.

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