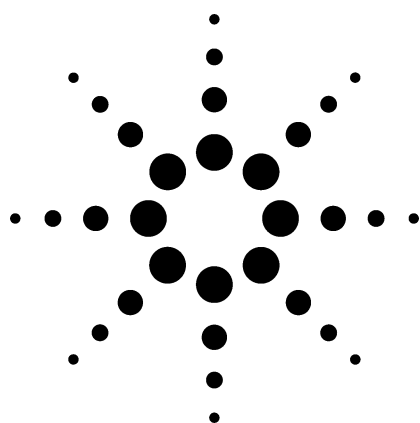




A Complete Solution for Chlorinated Pesticides and Herbicides Using DB-35ms and DB-XLB Columns

Application

Environmental

Author

Cameron George
Agilent Technologies, Inc.
2850 Centerville Road
Wilmington, DE 19808-1610
USA

Abstract

DB-35ms (primary) and DB-XLB (confirmation) columns, used with inert inlet components and hydrogen carrier gas, perform CLP pesticide analyses in less than 15 minutes total cycle time. Phenoxy acids can be analyzed with the same configuration.

Introduction

Obtaining high quality data in the shortest possible time is a desire of all analytical testing laboratories. To achieve this goal, all aspects of the chromatographic system must be optimized. The GC columns must possess the selectivity, inertness and thermal stability needed to achieve optimum resolution and sensitivity in the least amount of time. For the analysis of CLP pesticides and phenoxy acid herbicides, these needs are met with DB-35ms (primary) and DB-XLB (confirmation) columns.

In another Application Note[1], DB-35ms and DB-XLB show excellent selectivity and inertness for CLP pesticides, achieving one hundred percent

confirmation in less than 16 minutes. However, there is always the desire for a faster analysis. This note reports the result of changing to hydrogen carrier gas and increasing the oven ramp rate.

Experimental

Table 1 describes the columns and related inlet parts.

Table 1. Columns and Related Parts

Phase/Description	id (mm)	Film (µm)	Length (m)	Part number
DB-35ms	0.32	0.25	30	123-3832
DB-XLB	0.32	0.50	30	123-1236
Quartz deactivated splitter	-	-	-	5181-3398
Deactivated fused silica guard column	0.53	-	5	160-2535-5

This is a small sampling of the many DB columns and dimensions available.

Results and Discussion

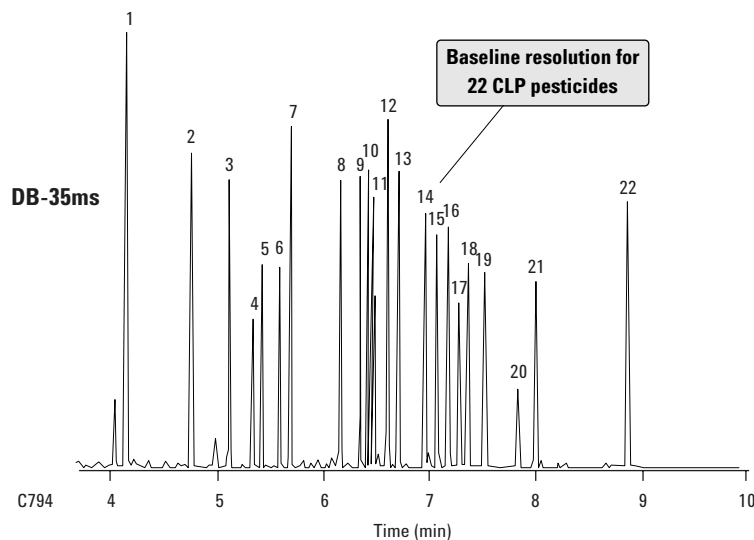
To reduce analysis time without a significant loss in resolution, the carrier gas was changed to hydrogen. Using hydrogen carrier gas with a linear velocity of 65 cm/sec, and increasing the oven ramp rate from 15 °C/min to 25 °C/min, reduces analysis time to less than 10 minutes. Considering a typical cool-down time of 4 to 5 minutes, the total instrument cycle-time is now less than 15 minutes.



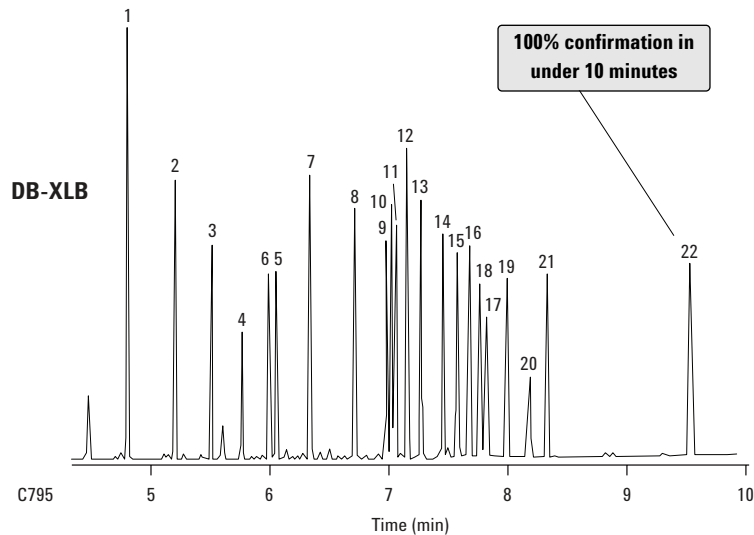
Agilent Technologies

Results and Discussion

Figure 1 shows the excellent resolution and confirmation available for CLP pesticides using DB-35ms/DB-XLB with hydrogen carrier gas and a properly scaled temperature program.



Columns: DB-35ms
30 m × 0.32 mm I.D., 0.25 μm
Part No.: 123-3832
DB-XLB
30 m × 0.32 mm I.D., 0.50 μm
Part No.: 123-1236
Carrier: Hydrogen at 65 cm/sec
(EPC in constant flow mode)
Oven: 110 °C for 0.5 min
110-320 °C at 25 °C/min
320 °C for 2 min
Injector: Splitless, 250 °C
30 sec purge activation time
50 pg per component
Detector: μECD, 350 °C
Nitrogen makeup gas (column +
makeup flow = 30 mL/min constant
flow)



1. Tetrachlorom-xylene (SS)
2. α-BHC
3. γ-BHC
4. β-BHC
5. Heptachlor
6. δ-BHC
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. α-Chlordane
11. Endosulfan I
12. 4,4'-DDE
13. Dieldrin
14. Endrin
15. 4,4'-DDD
16. Endosulfan II
17. 4,4'-DDT
18. Endrin aldehyde
19. Endosulfan sulfate
20. Methoxychlor
21. Endrin ketone
22. Decachlorobiphenyl

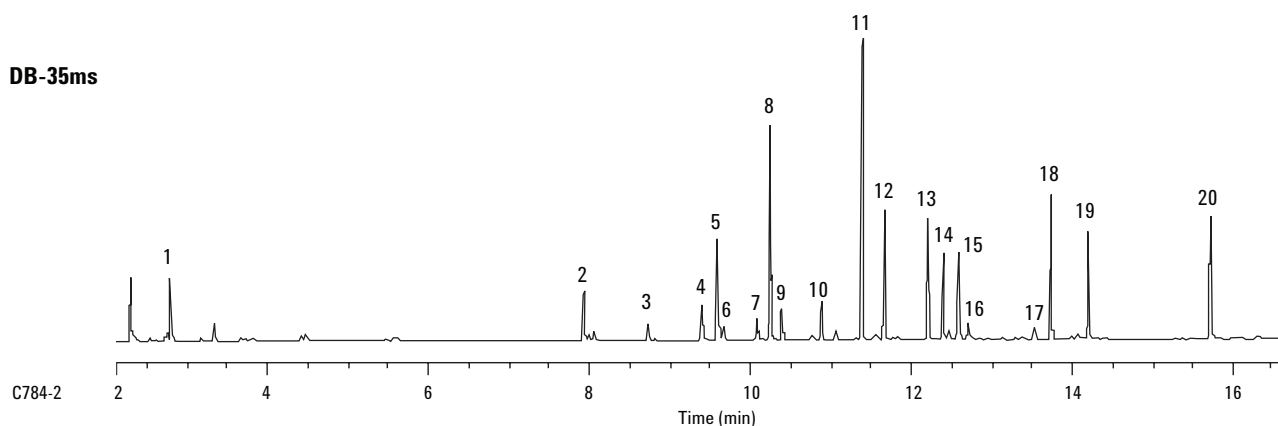
Figure 1 Analysis of CLP pesticides using DB-35ms and DB-XLB columns.

DB-XLB and DB-35ms have flexibility for a range of GC/ECD methods, a result of their ideal selectivity, inertness and the robustness of low bleed phases. Phenoxy acid herbicides (EPA Method 8151A) are nicely resolved with these columns. All twenty common herbicides are resolved in slightly

over 16 minutes, as shown in Figure 2. The analysis can be optimized for faster analysis. To obtain chromatograms and analysis conditions for additional GC/ECD methods, go to Agilent's Technical Support at www.agilent.com/chem

Columns: DB-35ms 30m × 0.32 mm I.D., 0.25 µm Part No.: 123-3832	Injector: Splitless, 250 °C 30 sec purge activation time 50 pg per component	7. MCPA 8. 4,4', Dibromooctafluorobi-phenyl (IS)
DB-XLB 30m × 0.32 mm I.D., 0.50 µm Part No.: 123-1236	Detector: µECD, 350 °C Nitrogen makeup gas (column + makeup flow = 30 mL/min constant flow)	9. Dichloroprop 10. 2,4-D 11. Pentachlorophenol
Carrier: Helium at 45 cm/sec (EPC in constant flow mode)		12. 2,4,5-T,P 13. 2,4,5-T 14. Chloramben
Oven: 50 °C for 0.5 min 50-100 °C at 25 °C/min 100-320 °C at 12 °C/min 320 °C for 2 min	1. Dalapon 2. 3,5-Dichlorobenzoic acid 3. 4-Nitrophenol 4. Methyl-2,4-dichlorophenyl-acetate (SS) 5. Dicamba 6. MCPP	15. Dinoseb 16. 2,4-DB 17. Bentazone 18. DCPA 19. Picloram 20. Acifluorfen

DB-35ms



DB-XLB

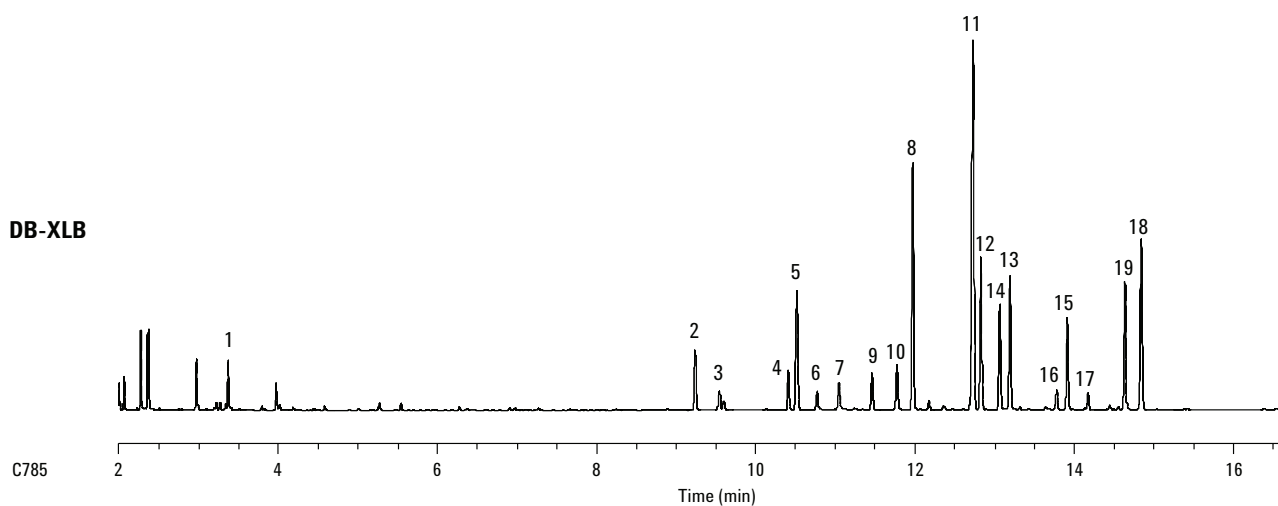


Figure 2. EPA 8151A phenoxy acid herbicides.

Conclusions

DB-XLB and DB-35ms columns, when used with inert inlet components, hydrogen carrier gas and an appropriate carrier velocity, yield these benefits:

- Short analysis times for better productivity
- Excellent thermal stability with 360 °C upper temperature limit
- Confirmation for CLP pesticides and phenoxy acid herbicide

Reference

1. "Rapid Analysis of CLP Pesticides Using High-Temperature DB-35ms and DB-XLB Columns," Application Note 5988-4973EN, Nov 26, 2001.

For More Information

For more information on our products and services, visit our Web site at www.agilent.com/chem.

Agilent shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Information, descriptions, and specifications in this publication are subject to change without notice.

© Agilent Technologies, Inc. 2001

Printed in the USA
December 17, 2001
5988-4971EN



Agilent Technologies