

Organochlorine Pesticides Analysis in Water by GC/ECD

Consumable workflow ordering guide





Confidently Identify and Quantify Organochlorine Pesticides

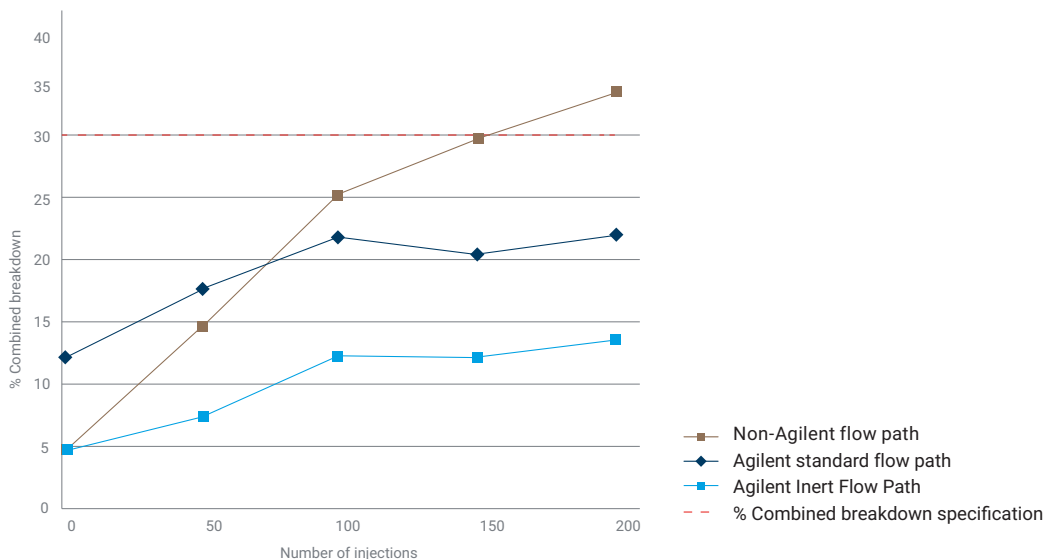
Organochlorine pesticides are common target analytes because they persist in soil or sediment, which affects water source quality. They are often measured following protocols from the Contract Laboratory Program (CLP) of the United States Environmental Protection Agency (EPA).

CLP protocols (EPA SW-846 Test Method 8081B) for organochlorine pesticides analysis specify dual-column confirmation with dual-electron capture detection (ECD). However, the parameters are general and nonexclusive, allowing the analyst to choose consumables and calibration protocols. Importantly, the method has specific system inertness requirements as measured by endrin and DDT degradation, which should not exceed 15% individually and <30% combined. If it does, maintenance or corrective action must occur.

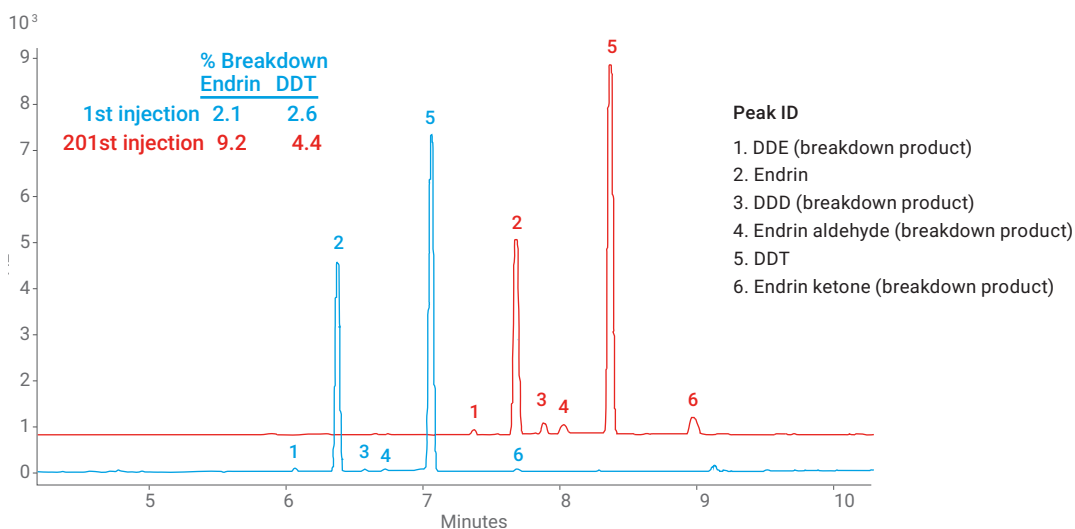
Other methods used to measure organochlorine pesticides in environmental matrices include EPA 8081A/B, 508.1, and 608.3. But regardless of which method is used, success depends upon minimizing interaction of active analytes, like endrin and DDT, with components along the GC flow path.

Reliable, reproducible analysis of sensitive organochlorine pesticides

Agilent Inert Flow Path supplies provide excellent surface inertness throughout the flow path—preventing analyte breakdown, response loss, and peak shape distortion. Also, the Agilent Inert Flow Path delivers excellent consistency, stability, and durability over multiple injections, supporting accurate analytical results while reducing instrument downtime.



Endrin/DDT combined breakdown profile of over 200 injections (isooctane) of Agilent inert (green), Agilent standard (brown), and non-Agilent deactivated flow path (blue).



50 ppb endrin/100 ppb DDT in isooctane breakdown on Agilent Inert Flow Path after 200 injections.¹

Maintain an Inert Flow Path from Injection to Detection



Ultra Inert GC inlet liners. Inlet liner inertness is essential to system inertness. For starters, breakdown reactions can occur on compromised or poorly deactivated glass and active silanol sites. Active sites on the liner can also latch onto active analytes, causing degradation or adsorption, and resulting in sensitivity loss and poor calibration curve linearity.



Ultra Inert gold seal. Active sites on the seals can lead to degradation or adsorption of active analytes. Agilent Ultra Inert gold seals are coated with proprietary Agilent Ultra Inert chemical deactivation for complete inertness. In addition, these seals are made with a metal injection molding process to provide a consistent, smooth surface and the best sealing. And that means they are less likely to leak—unlike machined-manufactured seals, which can have ridges and grooves.



UltiMetal Plus split/splitless inlet and Flexible Metal ferrules. These components are manufactured from stainless steel and coated with a novel UltiMetal coating to ensure complete inertness for inlet and detector connections.



Ultra Inert GC columns. Columns contribute toward the largest surface area within the GC flow path. Every Agilent J&W Ultra Inert GC column is rigorously tested to ensure consistently high inertness and low bleed for optimal delivery of analytes to the detector.



New gold-plated Flexible Metal ferrules. These recently introduced ferrules provide the best sealing properties for dual column connections using Agilent's capillary flow technology (CFT) devices and purged Ultimate unions. The gold plating prevents any potential air leakage caused by micro scratches while ensuring excellent inertness. This is not required if using a fused silica Y-splitter.



Self-Tightening column nuts. Installing fused silica columns can be difficult, and incorrectly positioned column nuts lead to flow path leaks, especially as the GC oven temperature fluctuates. Agilent Self-Tightening column nuts with column-locking collar make installation easy. Their spring-driven piston ensures a tight, leak-free seal over hundreds of injections and temperature cycles, guaranteeing the safe transfer of analytes through the flow path.



Agilent Ultra reference materials. Using standards that are manufactured to ISO 17024 and ISO 17035 guidelines are essential to reduce the amount of contaminants in the system. Agilent Ultra chemical standards are manufactured and packaged to reduce the amount of potential contaminants being introduced into the system.

Method 8081B: Organochlorine pesticides in water

This method is specific to organochlorine pesticides, eliminating the complications of combining organochlorine pesticide and PCB methods. The analysis of PCBs uses Method 8082, which includes PCB-specific cleanup and quantitation procedures.

The large number of analytes in Method 8081B makes testing difficult if all analytes are determined simultaneously. Therefore, quality control (QC) tests for the analytes of interest are typically performed first. These tests are determined either by a regulatory/control authority, in a permit, or by a client. If not specified, QC testing is performed for the analytes in the following table.

Minimum analyte QC test list and retention times for DB-CLP1, DB-CLP2, VF-5 Pesticides, and VF-1701 Pesticides.^{2,3}

Organochlorine Pesticide Analyte List	Retention Time (min)			
	Fast 7.5 min		19 min	
	DB-CLP1	DB-CLP2	VF-5 Pesticides	VF-1701 Pesticides
2,4,5,6-tetrachloro-m-xylene (surrogate standard)	2.57	3.02	5.51	5.34
α -BHC	2.87	3.27	6.29	7.32
γ -BHC (lindane)	3.1	3.48	6.96	8.23
β -BHC	3.22	3.63	6.79	9.99
Heptachlor	3.35	3.9	8.46	8.68
δ -BHC	3.42	3.81	7.55	10.54
Aldrin	3.55	4.17	9.26	9.32
Heptachlor epoxide	3.89	4.47	10.15	10.93
γ -Chlordane	4.08	4.71	10.69	11.69
α -Chlordane	4.12	4.79	10.99	11.82
Endosulfan I	4.16	4.81	10.99	11.56
4,4'-DDE	4.23	4.82	11.52	12.14
Dieldrin	4.39	5.01	11.63	12.43
Endrin	4.63	5.22	12.12	12.91
4,4'-DDD	4.7	5.3	12.51	14.07
Endosulfan II	4.85	5.47	12.39	14.01
4,4'-DDT	4.92	5.59	13.39	14.93
Endrin aldehyde	5.03	5.58	12.74	15.04
Endosulfan sulfate	5.2	5.78	13.29	15.76
Methoxychlor	5.5	5.9	14.72	15.9
Endrin ketone	5.78	6.15	14.41	16.69
Decachlorobiphenyl (surrogate standard)	6.63	7.46	18.44	18.48

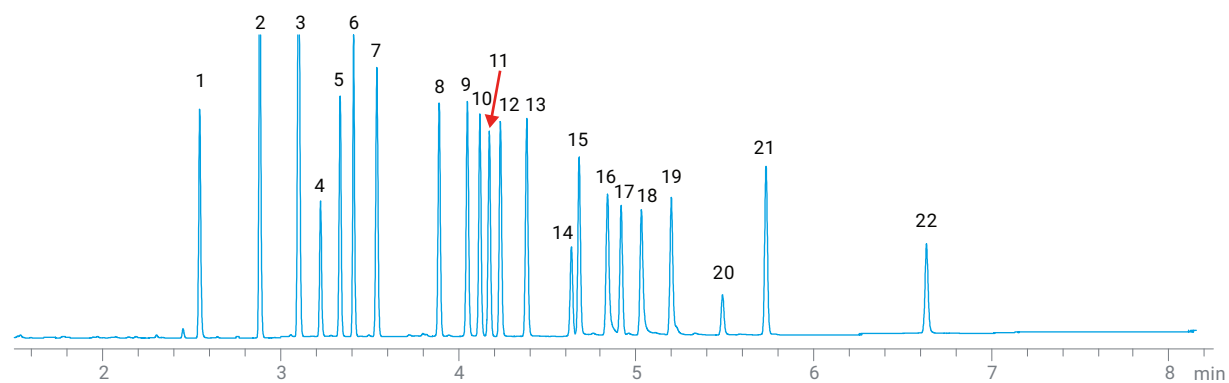
Agilent J&W DB-CLP1 and DB-CLP2 GC columns have complementary selectivity to provide excellent separation of CLP chlorinated compounds by GC/ECD. They also provide excellent inertness for meeting system requirements with fast analysis times of 7.5 minutes.

Fast CLP pesticides—chlorinated pesticides

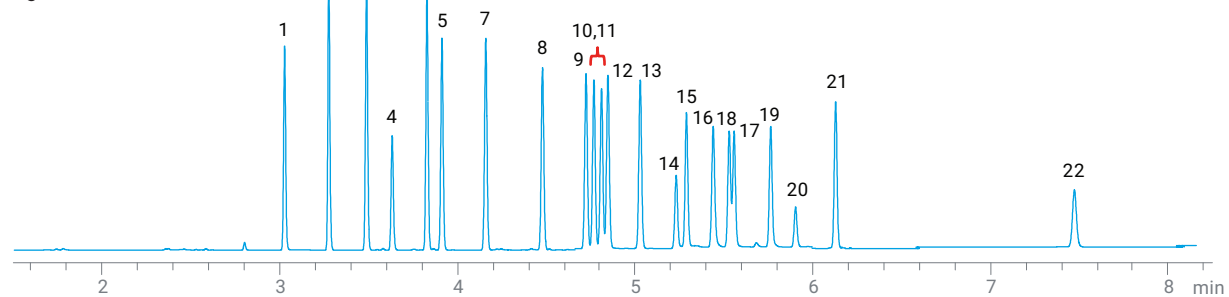
Conditions

Carrier: Helium, constant flow, 3.5 mL/min
 Injection temperature: 250 °C
 Injection: 1 µL, splitless
 Oven: 150 °C, hold 0.2 min, 45 °C/min to 250 °C,
 18 °C/min to 300 °C, 30 °C/min to 330 °C,
 hold 2.5 min
 Detector: µECD, 340 °C
 Sample: 50 ng/mL CLP pesticides

Agilent J&W DB-CLP1



Agilent J&W DB-CLP2



Peak ID

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

Fast separation of EPA 8081 organochlorine pesticides in under 7.5 minutes using DB-CLP1 and DB-CLP2 columns.²

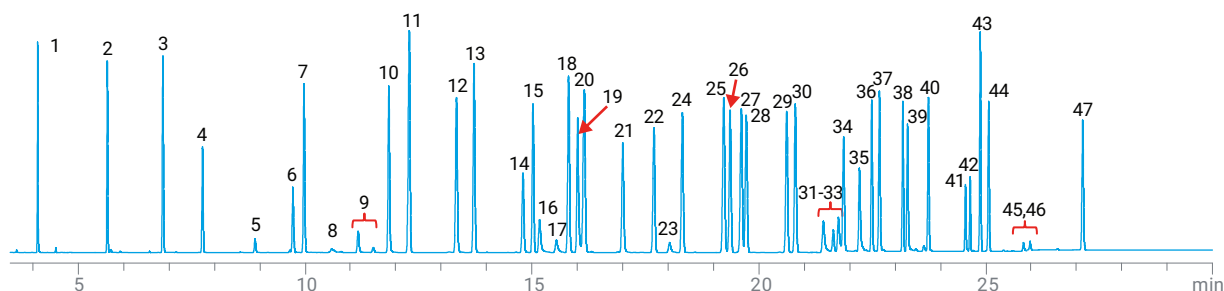
Agilent J&W DB-CLP1 and DB-CLP2 columns provided excellent resolution with the 30-minute EPA Method 8081B for the full extended list of 47 organochlorine pesticide analytes.

EPA Method 8081B (extended)—organochlorine pesticides

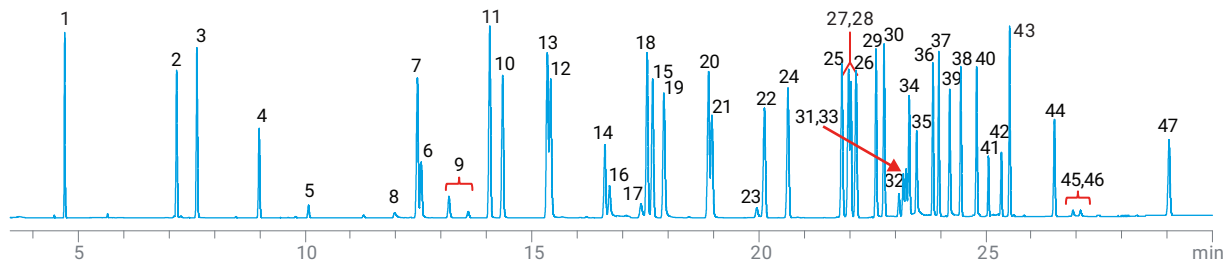
Conditions

Carrier: Helium, constant flow, 43.5 cm/s
 Injection temperature: 250 °C
 Injection: 2 µL, splitless
 Oven: 180 °C, hold 0.5 min, 20 °C/min to 150 °C,
 5 °C/min to 235 °C, 15 °C/min to 300 °C, hold 5 min
 Detector: µECD, 325 °C
 Sample: 50 ng/mL EPA 8081B analytes

Agilent J&W DB-CLP1



Agilent J&W DB-CLP2



Peak ID

1. 1,2-Dibromo-3-chloropropane	12. Pentachloronitrobenzene	24. Heptachlor epoxide	36. 4,4'-DDD
2. Hexachlorocyclopentadiene	13. γ-BHC	25. γ-Chlordane	37. Endosulfan II
3. 1-Bromo-2-nitrobenzene	14. β-BHC	26. trans-Nonachlor	38. 4,4'-DDT
4. Etr Diazole	15. Heptachlor	27. α-Chlordane	39. Endrin aldehyde
5. Chloroneb	16. Dichloro	28. Endosulfan I	40. Endosulfan sulphate
6. Trifluralin	17. Alachlor	29. 4,4'-DDE	41. Captafol
7. Terachloro-m-xylene (surrogate standard)	18. δ-BHC	30. Dieldrin	42. Methoxychlor
8. Propachlor	19. Chlorothalonil	31. Chlorobenzilate (250 ng/mL)	43. Endrin ketone
9. Diallate isomers (250 ng/mL)	20. Aldrin	32. Perthane (250 ng/mL)	44. Mirex
10. Hexachlorobenzene	21. DCPA	33. Chloropropylate (250 ng/mL)	45. cis-Permethrin
11. α-BHC	22. Isodrin	34. Endrin	46. trans-Permethrin
	23. Kelthane	35. Nitrofen	47. Decachlorobiphenyl (surrogate standard)

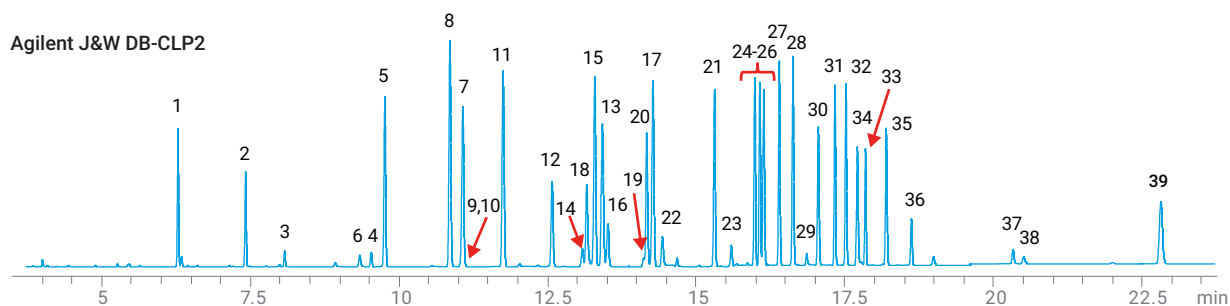
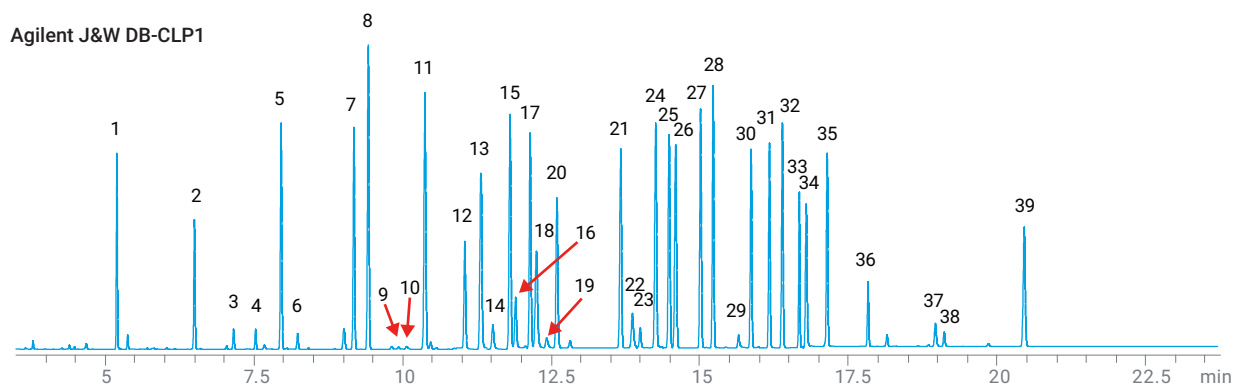
Agilent J&W CLP1 and DB-CLP2 columns separated 47 organochlorine pesticides in 30 minutes according to EPA Method 8081B (extended).²

While some manufacturers offer different column sets for the different methods, Agilent J&W DB-CLP1 and DB-CLP2 columns can be used for multiple EPA methods. These methods include EPA method 508.1 for chlorinated pesticides, herbicides, and organohalides in drinking water and groundwater.² Column versatility improves laboratory productivity by eliminating the need to switch between columns.

EPA Method 508.1—chlorinated pesticides and herbicides

Conditions

Carrier: Helium, constant flow, 35 cm/s
 Injection temperature: 250 °C
 Injection: 2 µL, splitless
 Oven: 80 °C, hold 0.5 min, 26 °C/min to 175 °C, 6.5 °C/min to 235 °C, 15 °C/min to 300 °C, hold 6 min
 Detector: µECD, 340 °C
 Sample: 100 ng/mL EPA 508.1 analytes, 100 ng/mL pesticide surrogate mix

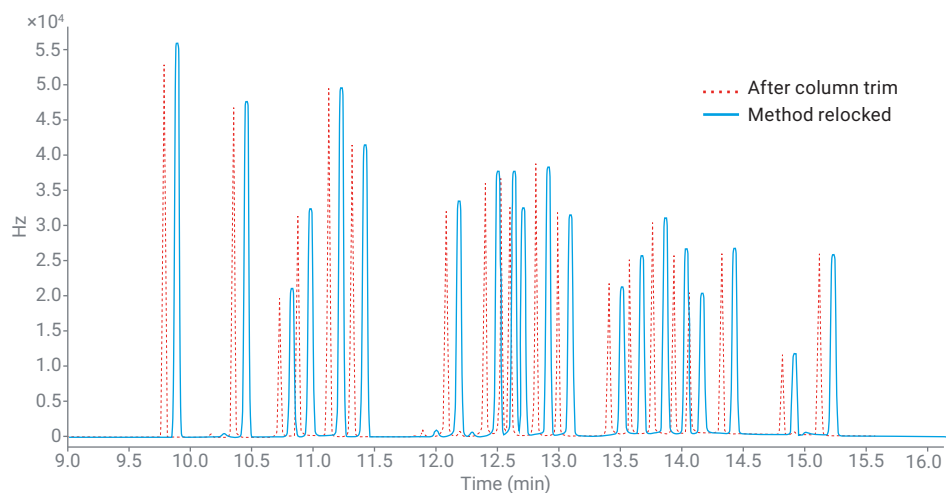
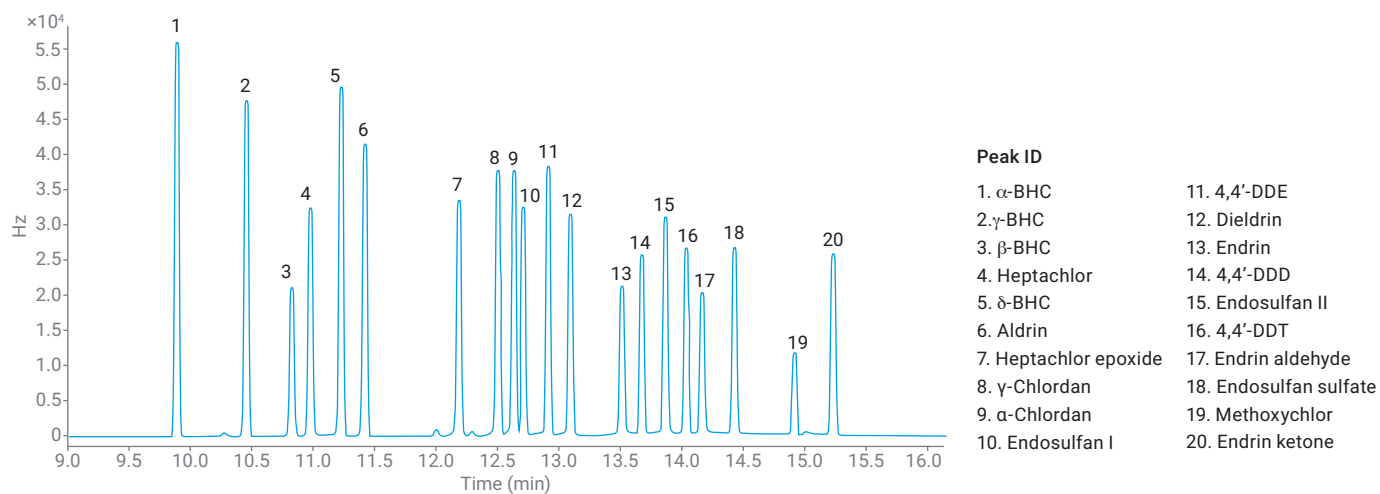


Peak ID

1. Hexachlorocyclopentadiene	8. α -BHC	16. Chlorothalonil	24. γ -Chlordane	32. Endosulfan II.
2. Etriazole	9. Atrazine	17. Aldrin	25. α -Chlordane	33. 4,4'-DDT
3. Chloroneb	10. Simazine	18. Metribuzin	26. Endosulfan I	34. Endrin aldehyde
4. Trifluralin	11. γ -BHC	19. Metolachlor	27. 4,4'-DDE	35. Endosulfan sulfate
5. Tetrachloro-m-xylene (surrogate standard)	12. β -BHC	20. DCPA	28. Dieldrin	36. Methoxychlor
6. Propachlor	13. Heptachlor	21. Heptachlor epoxide	29. Chlorobenzilate	37. <i>cis</i> -Permethrin
7. Hexachlorobenzene	14. Alachlor	22. Cyanazine	30. Endrin	38. <i>trans</i> -Permethrin
	15. δ -BHC	23. Butachlor	31. 4,4'-DDD	39. Decachlorobiphenyl (surrogate standard)

The Agilent J&W DB-CLP1 column separated all chlorinated pesticides and herbicides according to EPA 508.1.²

Maintaining consistent retention times after routine maintenance and across instruments minimizes the time it takes to update calibration tables and integration events. OpenLab CDS includes a retention time locking (RTL) wizard that automates the process for all 20 organochlorine pesticide compounds showing less than 0.008% RSD.⁴



Retention time locking of 20 organochlorine pesticides on an Agilent J&W DB-CLP1 column.

Intelligent. Intuitive. Innovative. Agilent Intuvo 9000 GC system

With its efficiency and cost effectiveness, the Intuvo 9000 GC transforms your GC experience and is ideal for organochlorine pesticides analysis.⁵

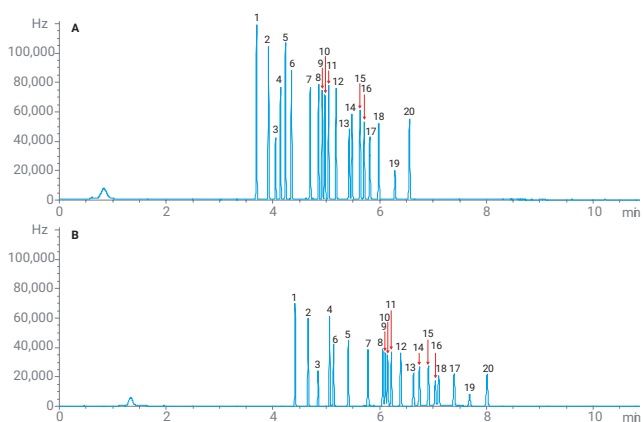
1. Flow path inertness maintains system inertness for sensitive analysis.
2. Modular inert Flow Chips allow for easy configuration of two columns.
3. Guard Chip protects downstream components from matrix, eliminating the need to trim the column. It also leaves retention times unchanged—decreasing instrument downtime and increasing lab productivity.



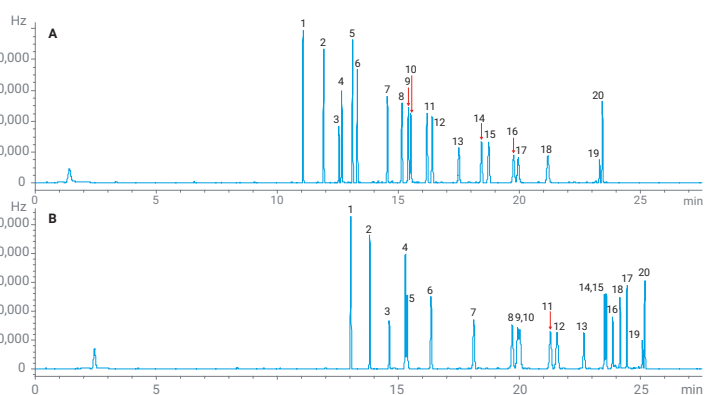
Comparison of the 30-minute EPA 8081B method and a Rapid 11-minute method, using an Intuvo 9000 Dual ECD GC system

Conditions

	30-Minute Method	11-Minute Method
Inlet:	240 °C	
Pulsed splitless:	60 psi for 0.3 minutes, 75 mL/min at 0.5 minutes	
Column 1:	Agilent DB-CLP1 (30 m × 320 μm, 0.25 μm)	
Column 2:	Agilent DB-CLP2 (30 m × 320 μm, 0.50 μm)	
Column flow rate:	3 mL/min	3 mL/min
Oven:	100 °C (1 minute), 10 °C/min to 225 °C (8 minutes), 30 °C/min to 300 °C (5.25 minutes)	120 °C (0.2 minutes), 45 °C/min to 250 °C, 18 °C/min to 300 °C (5 minutes)
Guard Chip:	Track oven	
Bus:	260 °C	
ECDs:	300 °C 30 mL/min makeup flow	



Fast separation of organochlorine pesticides in eight minutes using DB-CLP1 and DB-CLP2 columns.⁵



Separation of organochlorine pesticides according to the 30 minute EPA Method 8081B (extended) using DB-CLP1 and DB-CLP2 columns.

Peak ID

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

Recommended Products for Organochlorine Pesticide Analysis in Water

To add the items under each category to your “Favorite Products ±” list at the Agilent online store, simply click the MyList links in each header. Then, enter the quantities for the products you need. Your list of items will remain under “Favorite Products” for you to use with future orders.

MyList of columns and supplies for organochlorine pesticide analysis using the 7890/8890/8860 GC systems

Description	Part No.
Inlet Supplies	
Inlet septa, Advanced green, nonstick, 11 mm, 50/pk	5183-4759
Inlet septa, Advanced green, nonstick, 11 mm, 100/pk	5183-4759-100
Ultra Inert splitless, single taper*	5190-2292
Ultra Inert splitless, single taper, 5/pk*	5190-3162
Ultra Inert splitless, single taper, glass wool	5190-2293
Ultra Inert splitless, single taper, glass wool, 5/pk	5190-3163
Ultra Inert splitless single-taper liner with glass frit	5190-5112
Ultra Inert splitless single-taper liner with glass frit, 5/pk	5190-5112-005
Ultra Inert splitless, double taper (EPA 505)*	5190-3983
Ultra Inert splitless, double taper (EPA 505), 5/pk*	5190-4007
Ultra Inert gold seal, with washer, 1/pk	5190-6144
Ultra Inert gold seal, with washer, 10/pk	5190-6145
Self-Tightening column nut, collared, inlet	G3440-81011
Self-Tightening column nut, collared, MSD	G3440-81013
Replacement collar for Self-Tightening nut	G3440-81012
15% Graphite/85% Vespel ferrules, 0.4 mm id, 10/pk	5181-3323
5 µL ALS syringe, fixed needle, 23-26s/42/cone	5181-1273
5 µL ALS syringe, fixed needle, 23-26s/42/cone, 6/pk	5181-8810
10 µL ALS syringe, fixed needle, 23-26s/42/cone	5181-1267
10 µL ALS syringe, fixed needle, 23-26s/42/cone, 6/pk	5181-3360
20x magnifier	430-1020

GC Columns	
DB-CLP1; 30 m x 0.32 mm, 0.25 µm	123-8232
DB-CLP2; 30 m x 0.32 mm, 0.50 µm	123-8336
VF-1701 Pesticides; 30 m x 0.25 mm, 0.25 µm	CP9070
VF-5 Pesticides; 30 m x 0.25 mm, 0.25 µm	CP9074
Gas Filters	
Gas Clean carrier gas kit for 7890	CP17988
Gas Clean carrier gas kit for 8890 and 8860	CP179880
Gas Clean carrier gas purifier replacement cartridge	CP17973
Vials and Caps	
2 mL screw top amber, write-on spot, deactivated, certified, 100/pk	5183-2072
Screw caps, blue, certified, PTFE/silicone/PTFE septa	5182-0723
250 µL vial insert, glass with polymer feet	5181-8872
Supplies for CFT Device	
CFT Ferrule, Flexi, gold 0.25 mm id column, 10/pk	G2855-28501
CFT Ferrule, Flexi, gold 0.32 mm id column, 10/pk	G2855-28502
CFT Ferrule, Flexi, gold 0.53 mm id column, 10/pk	G2855-28503
CFT Ferrule, Flexi, gold UM small, 10/pk	G2855-28505
CFT Ferrule, Flexi, gold UM large, 10/pk	G2855-28506

±First time using “Favorite Products”? You will be asked to enter your email address for account verification. If you have an existing Agilent account, you will be able to log in. If you don't have a registered Agilent account, you will need to register for one. This feature is valid only in countries that are e-commerce enabled. All items can also be ordered through your regular sales and distributor channels.

*Use only with clean water samples, such as drinking water. For dirtier matrices, use liners with glass frit or glass wool to avoid frequent column trimming.

MyList of columns and supplies for organochlorine pesticide analysis using the Intuvo 9000 GC system

Description	Part No.
Inlet Supplies	
Inlet septa, Advanced Green, nonstick, 11 mm, 50/pk	5183-4759
Inlet septa, Advanced Green, nonstick, 11 mm, 100/pk	5183-4759-100
Ultra Inert splitless, single taper*	5190-2292
Ultra Inert splitless, single taper, 5/pk*	5190-3162
Ultra Inert splitless, single taper, glass wool	5190-2293
Ultra Inert splitless, single taper, glass wool, 5/pk	5190-3163
Ultra Inert splitless, single-taper liner with glass frit	5190-5112
Ultra Inert splitless, single-taper liner with glass frit, 5/pk	5190-5112-005
Ultra Inert splitless, double taper (EPA 505)*	5190-3983
Ultra Inert splitless, double taper (EPA 505), 5/pk*	5190-4007
5 µL ALS syringe, fixed needle, 23-26s/42/cone	5181-1273
5 µL ALS syringe, fixed needle, 23-26s/42/cone, 6/pk	5181-8810
10 µL ALS syringe, fixed needle, 23-26s/42/cone	5181-1267
10 µL ALS syringe, fixed needle, 23-26s/42/cone, 6/pk	5181-3360
20x magnifier loop	430-1020
Intuvo Supplies	
Guard Chip, Intuvo split/splitless	G4587-60565
Inlet Chip	G4581-60031
Flow Chip, D2-MS	G4581-60033
Flow Chip, swaged HES MS tail	G4590-60109
Inlet/MSD polyimide gasket	5190-9072
Intuvo GC Columns	
Agilent DB-CLP1 (30 m × 0.32 mm, 0.25 µm)	123-8232-INT
Agilent DB-CLP2 (30 m × 0.32 mm, 0.50 µm)	123-8336-INT
Gas Filters	
Gas Clean filter kit	CP17995

**Use only with clean water samples, such as drinking water. For dirtier matrices, use liners with glass frit or glass wool to avoid frequent column trimming.*

MyList of EPA 8081 standards for organochlorine pesticide analysis

Description	Part No.
EPA method 8081A kit	PPK-8081
Organochlorine pesticides standard mix in acetone	PPM-838-1
Organochlorine pesticides standard mix in isooctane	PPM-828-1
Organochlorine pesticides standard mix in hexane: toluene	PPM-808F-1
Organochlorine pesticides standard mix in hexane: toluene	PPM-808C-1
Organochlorine pesticides standard mix in hexane: toluene	PPM-808G-1
Pesticides matrix spiking standard	CLP-200N-1
Pesticides surrogate standard	ISM-320-1
4-Chloro-3-nitrobenzotrifluoride	PPS-360-1
1-Bromo-2-nitrobenzene	PPS-351-1
Pentachloronitrobenzene	PPS-133-1
Chlordane	PP-151-1
Toxaphene	PP-271-1
Chlorinated hydrocarbon pesticides	EPA-2101N-1

MyList of EPA 608 standards for organochlorine pesticide analysis

Description	Part No.
Organochlorine pesticides standard mix in hexane: toluene	US-102BN-1
Organochlorine pesticide kit	PPK-608B
Organochlorine pesticide	PPM-655-1
Organochlorine pesticide	PPM-609-1
Organochlorine pesticide	PPM-608C-1
Organochlorine pesticide	PPM-695-1
Organochlorine pesticide	PPM-660-1
Organochlorine pesticide	PPM-685-1
Organochlorine pesticide	PPM-680-1
Organochlorine pesticide	PPM-608B-1
Pesticides surrogate standard	ISM-301-1
Pesticides surrogate standard	ISM-320-1
Chlordane	PP-150-1
Toxaphene	PP-270-1
Chlorinated hydrocarbon pesticides	EPA-2101N-1

MyList of EPA 508.1 standards for organochlorine pesticide analysis

Description	Part No.
Organochlorine pesticides standard mix in ethyl acetate	PPM-508G-1
Organochlorine pesticides standard mix in ethyl acetate	PPM-509-1
Organochlorine pesticides standard mix in ethyl acetate	PPM-506-1
Organochlorine pesticides standard mix in ethyl acetate	PPM-508F-1
Organochlorine pesticides standard mix in ethyl acetate	PPM-175-1
Pesticide degradation check mix	ISM-451-1
Pesticide degradation check mix	ISM-453-1
Organochlorine pesticides standard	PPM-508B-1
Organochlorine pesticides standard	PPM-508D-1
Pentachloronitrobenzene	PPS-132-1
4,4'-Dichlorobiphenyl	PPS-120-1
4,4'-Dibromobiphenyl	PPS-420-1
Toxaphene	PPS-240-1
Laboratory performance check	PPM-508-1

MyList of SPME sample preparation supplies for organochlorine pesticide analysis

Description	Part No.
Vial, screw top, headspace, amber, round bottom, 20 mL, 23 x 75 mm, 100/pk Vial size: 22.75 x 75 mm (18 mm cap)	5188-6537
Caps/septa, screw, headspace, steel, high temperature septa, certified, 18 mm, 100/pk (18 mm cap size)	5188-2759
Inlet liner, Ultra Inert, splitless, straight, 0.75 mm id, for SPME	5190-4048
SPME fiber, PDMS-100/10-P3, red, 3/pk	5191-5872
SPME fiber, DVB/C-WR/PDMS/10, gray, 3/pk	5191-5874
Inlet septa, bleed and temperature optimized (BTO), nonstick, 11 mm	5183-4757
Inlet septa, Advanced Green, nonstick, 11 mm	5183-4759
Merlin Microseal starter kit, general purpose (100 psi), includes nut and Microseal	5182-3442
Merlin Microseal 100 psi nut	5182-3445
Merlin Microseal general purpose (100 psi) replacement Microseal	5182-3444
Inlet liner, Ultra Inert, splitless, straight, 2 mm id	5190-6168
SPME Arrow, PDMS (polydimethylsiloxane), 1.10 mm, 100 µm, red, 3/pk	5191-5862
SPME Arrow, PDMS (polydimethylsiloxane), 1.50 mm, 100 µm, red, 3/pk	5191-5866
SPME Arrow, PDMS (polydimethylsiloxane), 1.50 mm, 250 µm, black, 3/pk	5191-5867
SPME Arrow, DVB/carbon WR/PDMS (divinylbenzene, carbon wide range, polydimethylsiloxane), 1.10 mm, 120 µm, dark gray, 3/pk	5191-5861
SPME Arrow, DVB/carbon WR/PDMS (divinylbenzene, carbon wide range, polydimethylsiloxane), 1.50 mm, 120 µm, dark gray, 3/pk	5191-5864
Merlin Microseal nut for use with SPME Arrows	5182-3446
Replacement Microseals for use with 1.1 mm Arrow SPME probes	5182-3447
Replacement Microseals for use with 1.5 mm Arrow SPME probes	5182-3448

Reference:

1. Endrin and DDT Breakdown Evaluation Using an Agilent Inert Flow Path Solution. [5991-1862EN](#)
2. Evaluating CLP and EPA Methods for Pesticides in Water Using Agilent J&W DB-CLP1/DB-CLP2 GC Columns. [5991-0615EN](#)
3. Dual Column 8081 Pesticide Analysis by GC/ECD with Agilent J&W FactorFour VF-5 Pesticides and VF-1701 Pesticides Columns. [SI-00924EN](#)
4. Retention Time Locking of Organochlorine Pesticides on an Agilent 8860 GC System Using the OpenLab Retention Time Locking Wizard. [5994-0551EN](#)
5. Organochlorine Pesticide Analysis Using an Agilent Intuvo 9000 Dual ECD GC System. [5991-9000EN](#)



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