New Application Specific Columns for Semi-volatile and ECD Methods Lead the Way to Higher Productivity in Environmental Laboratories

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Agilent Technologies

Presentation Outline

- DB-UI 8270D columns for semi-volatile analysis
  - Testing procedures
  - Example chromatograms
  - Addition productivity enhancing tools

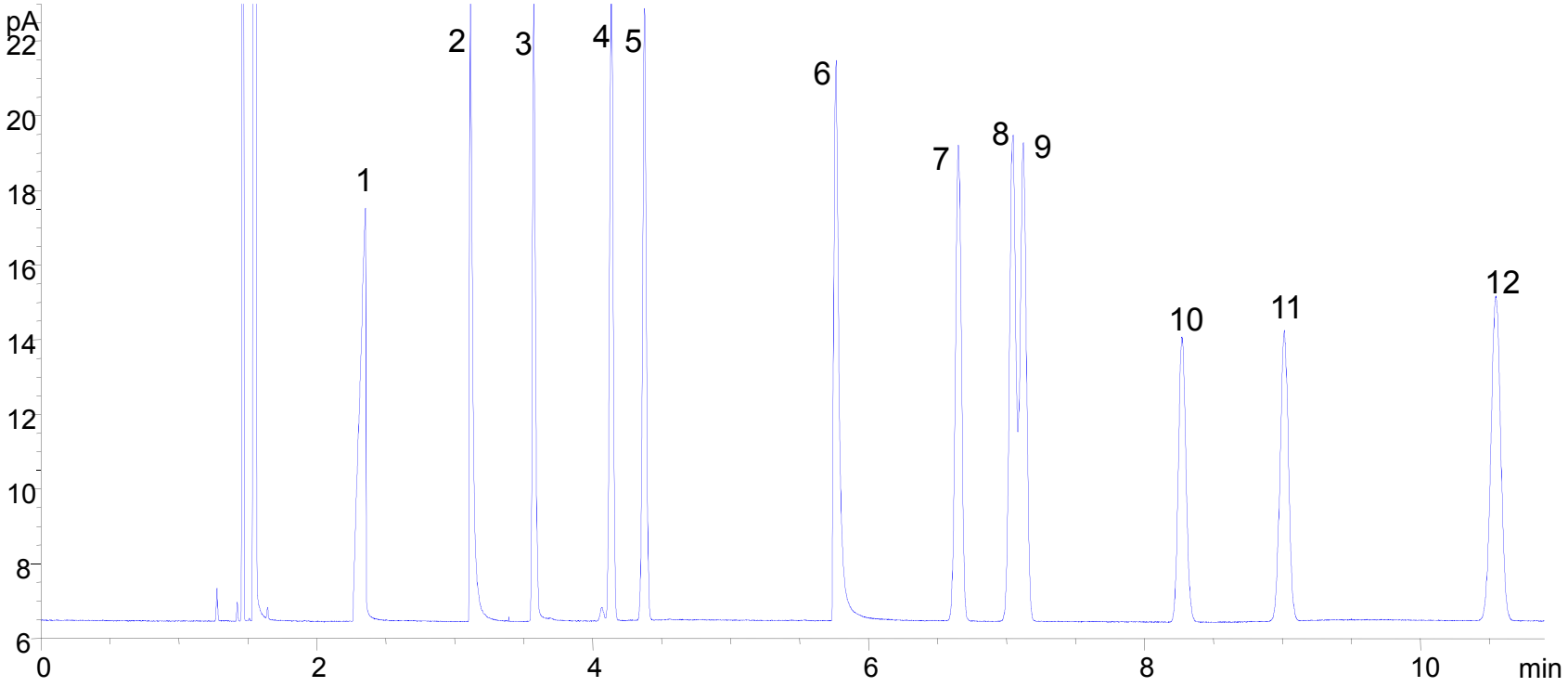
- DB-CLP1 and DB-CLP2 columns for dual ECD methods
  - Testing procedures
  - Example chromatograms
  - Additional productivity enhancing tools

Agilent J&W DB-UI 8270D Design

Designed specifically for environmental laboratories performing regulated GC/MS semi-volatiles analysis needing improved resolution and peak shape for active target compounds, DB-UI 8270D columns are engineered and special tested to provide added assurance of optimal peak shape performance for trace level active semivolatile and priority pollutants to ensure confidence in analytical results.

Agilent DB-UI 8270D columns are manufactured with world class quality, column to column consistency and worldwide availability. Stringent testing included with each column provides proof of performance.

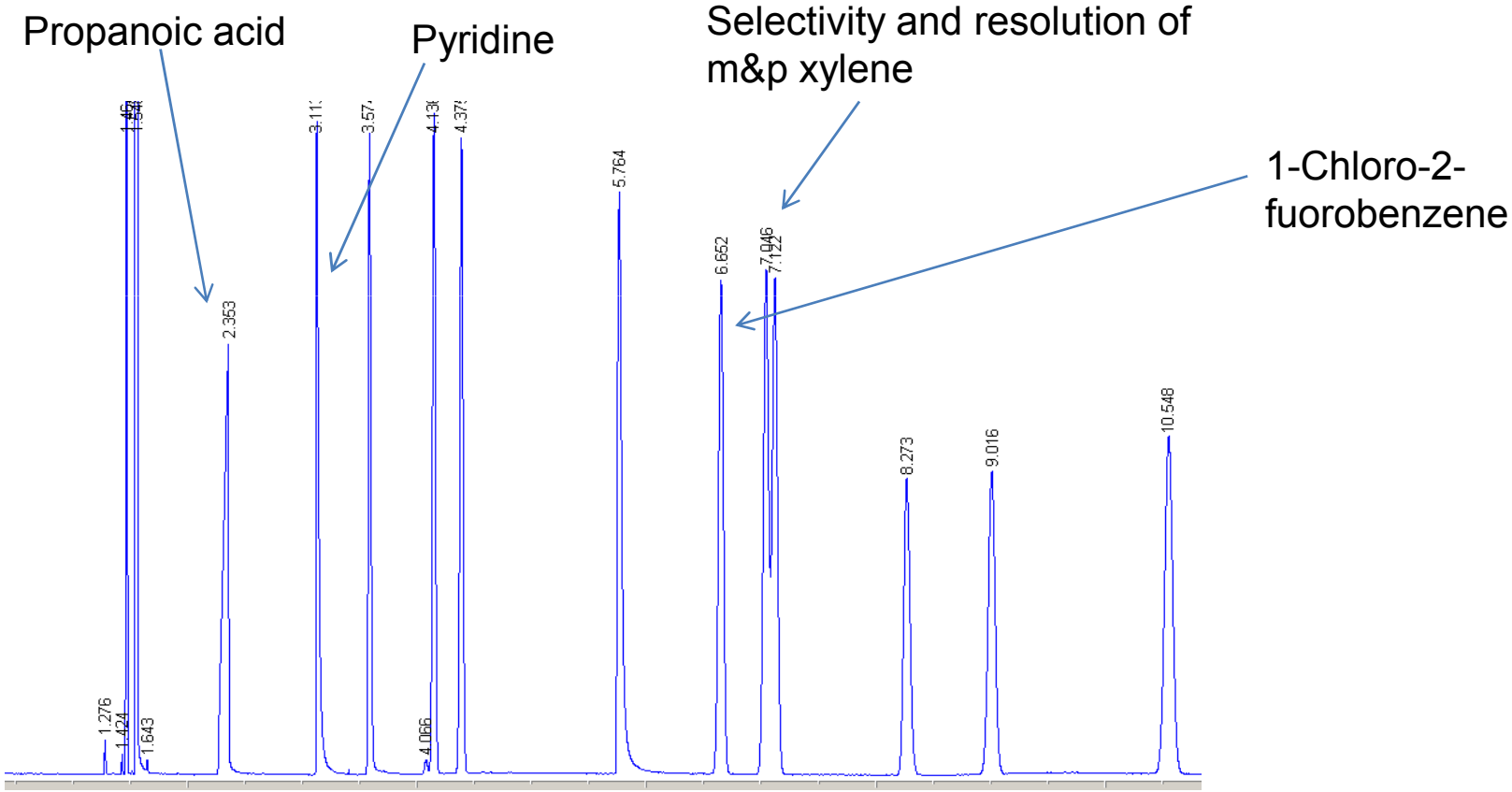
DB-UI 8270D Example Test Chromatogram



1	Propionic acid	5	n-Octane	9	p-Xylene
2	Pyridine	6	1,2-Butanediol	10	2-Heptanone
3	1-Pentanol	7	1-Chloro-2-flourobenzene	11	n-Nonane
4	1-Octene	8	m-Xylene	12	Isopropylbenzene

Testing conditions and probe significance.

- Ultra low volume solvent test mix eliminates solvent masking of activity
- Low concentration test probe mixture (~5-10 ng on column)
- 45°C low test temp more stringent test for inertness by allowing us to test small molecule (stronger) acid probe, smaller molecule (stronger) basic probe and smaller molecule (more demanding) primary alcohol plus a demanding –diol to measure silanol activity.
- m & p- xylene are surrogate representatives of aromatic isomers and optimized phase selectivity (RI measurement) for getting highest resolution (resolution measurement) for semi-volatile aromatic isomers.
- Halogenated aromatic to measure for reproducible selectivity of the column for similar semivolatiles found in typical analyses.



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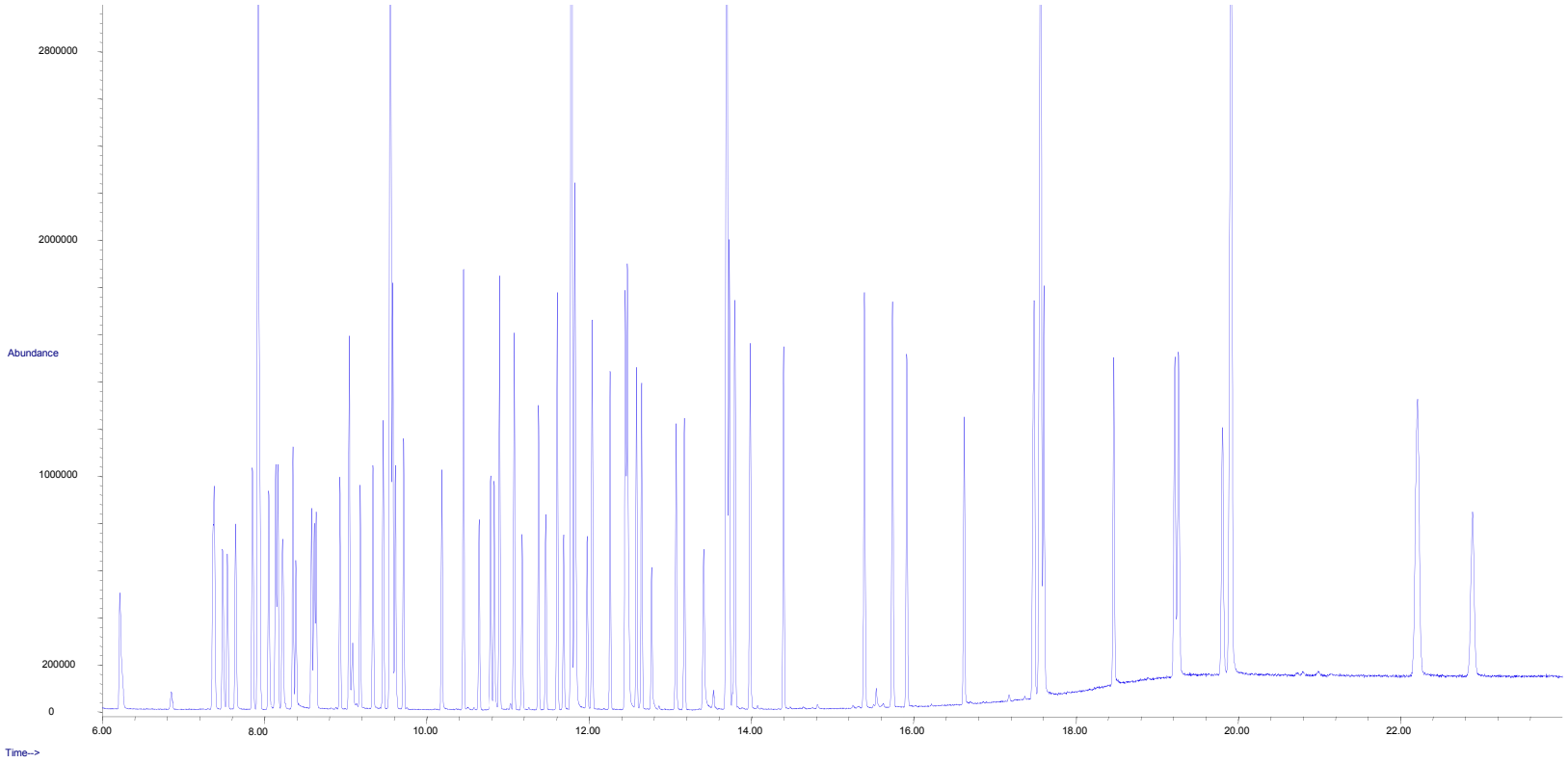
78 Semi-Volatile Components on a DB-UI 8270D 30m x 0.25 x 0.25



25 minute Semi-Volatile Analysis

Application note 5991-0250EN

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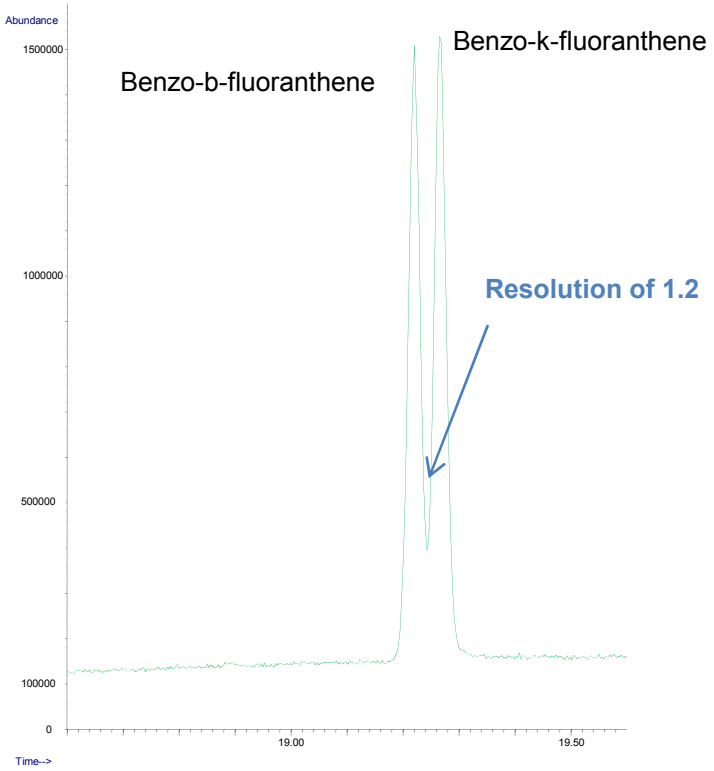
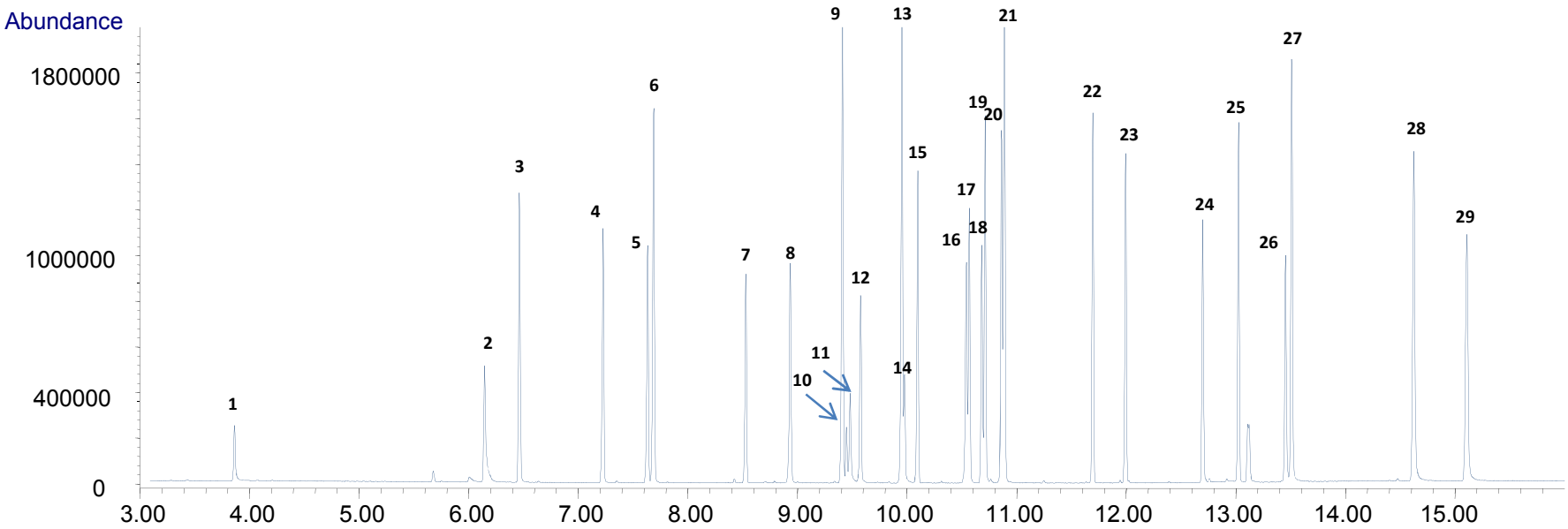
Resolution of benzo-b & k fluoranthene isomers



Positional isomers

Column:	Agilent DB-UI 8270D, 30 m x 0.25 mm, 0.25 µm (p/n 122-9732)
Liner:	Dual taper direct connect liner (p/n G1544-80700)
Inlet:	MMI in non-pulsed splitless mode 1 µL at 275 °C
Carrier:	He, 1.2 mL/min, constant flow
Septum purge flow:	3 mL/min, purge time on 0.7 min 50 mL/min
Oven program:	30 °C (1.0 min), 15 °C/min to 100 °C, 20 oC/min to 240 °C (0.5 min), 15 °C/min to 325 °C (6.7 min) Gas saver Off
GC/MSD:	Agilent 7890/5975C, 325 °C transfer line, 280 °C source, 150 °C quad, 35-500 AMU range
Sampler:	Agilent 7693, 10.0 µL syringe (p/n G4513-80216)

10 ng/ul Semivolatile Checkout Standard on 20m x 0.18mm x 0.36um DB-8270D Capillary GC Column using an Ultra Inert Liner with Wool

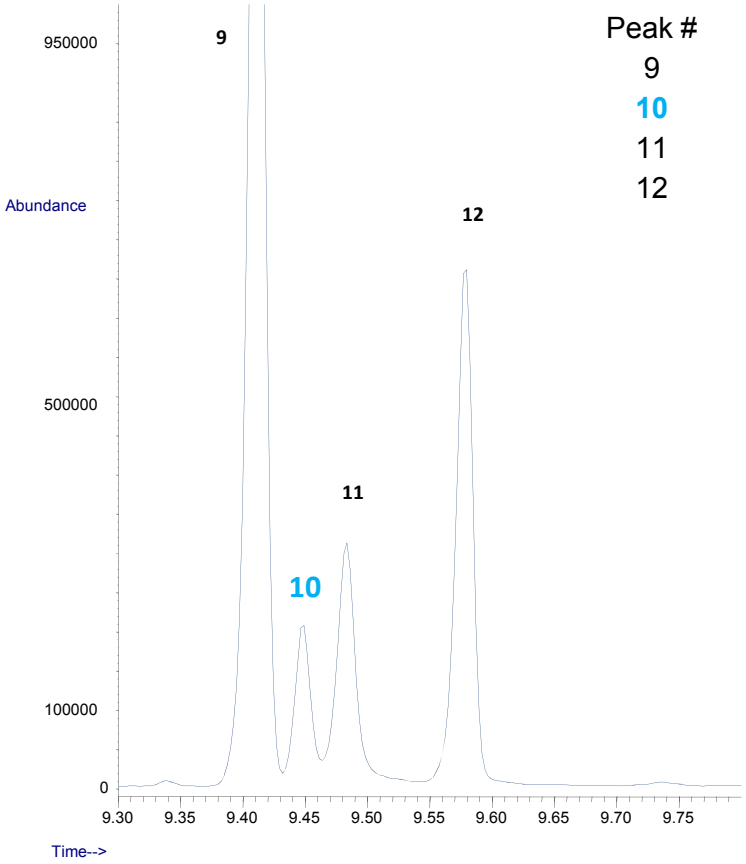


1	N-Nitrosodimethylamine	11	4-nitrophenol	21	Phenanthrene-d10
2	Aniline	12	2,4-dinitrotoluene	22	Aldrin
3	1,4-Dichlorobenzene-d4	13	Flourene	23	Heptachlor epoxide
4	Isophorone	14	4,6-dinitro-2-methyl phenol	24	Endrin
5	1,3-dimethyl-2-nitrobenzene	15	Trifluralin	25	4,4'-DDT
6	Naphthalene	16	Simazine	26	3,3'-dichlorobenzidine
7	hexachlorocyclopentadiene	17	Atrazine	27	Chrysene d-12
8	Mevinphos	18	pentachorophenol	28	benzo[b]flouranthene
9	Acenaphthene-d10	19	Terbufos	29	Perylene-d12
10	2,4-dinitrophenol	20	Chlorothanlonil		

16 minute Semi-Volatile Analysis

Checkout Standard mix Agilent part # 5190-0473

Excellent Peak Shape and Response for 2,4 Dinitrophenol

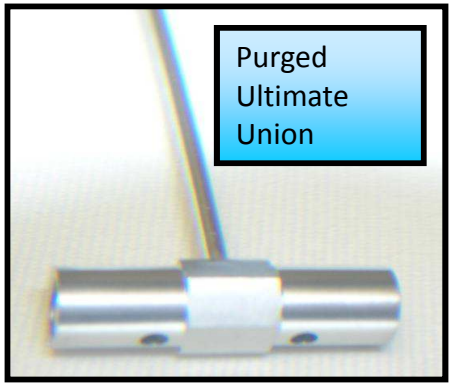


Peak #	Compound
9	Acenaphthalene D10
10	**2,4 Dinitrophenol**
11	4 Nitro phenol
12	2,4 Dinitro toluene

Column 1:	Agilent J&W 8270-D 20 m x 0.18mm x 0.36 um
Column 2:	1 m 0.15 mm ID deactivated 2 psi with 5ml/min bleeder
Carrier:	1 ml/min constant flow at 40^{O}/C, AUX EPC 2 PSI constant pressure
Backflush:	postrun 75 psi AUX EPC 2 PSI inlet
Oven:	40^{o}C (2.5min) to 320^{O}C (25^{O}/min) 4.8 min hold
Injection:	280^{o}C Pulsed splitless 44 psi until 0.3 min, purge flow 60ml/min on at 0.35 min
Liner:	UI single taper
MSD:	Transfer Line 290^{O}C , Source 300^{O}C, Quad 150^{O}C 50 -550 AMU

Additional productivity enhancing tools

- Free method translation software
- Ultra Inert Liners with “touch-less packaging”
- Gas Clean filters
- CFT fittings and devices
- Turn key analyzer solutions

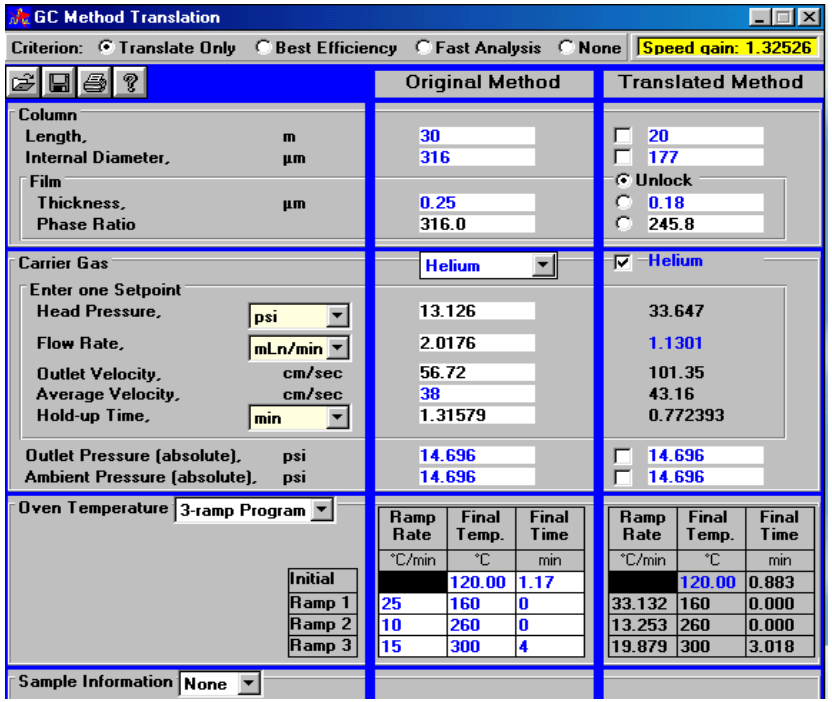


DB-UI 8270D

- World wide recognized EPA method for Semi-volatiles analysis
- Tested for optimal inertness, selectivity and low bleed
- Available in convenient 6-packs in the US for high volume labs
  - 20 m x 0.18mm x 0.36um format
  - 30m x 0.25mm x 0.25um format
  - Bulk discounting 6 for the price of 5 (US only)

DB-UI 8270D flyer

Method Translation Software



- Four translation modes
  - Translation only
  - Best efficiency
  - Fast analysis

  } Lock all carrier gas parameters, making the flow rate an independent parameter.

  - None (unlock all carrier gas parameters)

- If translating to a different ID column, phase ratio should be maintained for the most reliable results
- If there are significant differences in phase ratio, Method Translation Software can still be used but elution order should be confirmed.
- Stationary phase of a new column must be the same as the original – the Method Translation Software cannot account for differences in selectivity.

Method Translation Made Simple

- Agilent Method Translation Software
  - A **FREE, stand-alone** software running on a PC
  - Method Translation allows easy “tweaking” of method parameters to speed up run time.
  - It preserves relative elution order by properly scaling gas velocity and temperature program to maintain equivalent elution pattern.

- Can Change
  - column dimensions (i.e. ID, column length, film thickness, or phase ratio)
  - carrier gas type (i.e. hydrogen, helium, nitrogen)
  - pneumatic set points (i.e. flow rates, head pressure, or holdup time).
  - The software then generate a translated method (new temperature program), which will attempt to maintain the resolution and selectivity of the original method.

- Benefits
  - reduces method development time
  - helps assess if GC method is compatible with hardware

Useful References

Application Note: 5991-0250EN Semi-Volatile Analysis with Specifically Designed DB-UI 8270D Columns

Why Inertness Matter in Gas Phase Analysis, Poster at Pittcon 2012

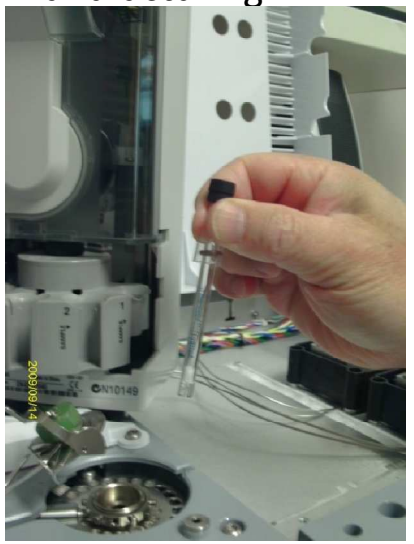
Method Translation in Gas Chromatography LC/GC article July, 2011

GC Method Translation Software - Agilent - Agilent Technologies
*www.chem.agilent.com/en-US/Support/.../**GcMethodTranslation**.aspx*

You tube video on Method Translation software:
www.youtube.com/watch?v=bRupj5925_Y

Ultra Inert Deactivated Liners

- Agilent owns, manages, and does the deactivation in our Folsom facility
  - New manufacturing processes based on chemistry of **J&W Ultra Inert GC columns**
  - Elimination of fatty acid contamination – a common side effect of glass wool manufacturing
- Unequalled Manufacturing Quality Control
- Lot testing ensures reproducible coverage of deactivation
- QC test with probes selected to reveal activity
- GC method tailored to test liner -- not column or system -- inertness
  - Lab notebook friendly **Certificate on a sticker** shipped with each liner



- New patent pending "**Touchless**" packaging…
- Plasma treated Non-Stick **O-ring is preinstalled** on the liner
- Packaging is Pharmaceutical grade PTEG tubing approved by GCMS extraction testing
- Install new liner and O-ring without touching – or risk contaminating – the new, clean liner

Reliability / Quality Assurance : Ultra Inert Liner Certificate of Performance

Lot to Lot Liner Reproducibility assured:

Each deactivation lot is Certified to ensure consistent and efficient coverage using both acidic and basic probes at trace (2 ng) levels on column

Certificate with every liner is printed on a label ready to peel and stick into analysts' laboratory notebooks for easier compliance.

Traceability:

Deactivation Lot number is on Certificate

Liner lot number (and part number) is permanently etched on glass

Ultra Inert liners and packaging – to meet the needs of your lab

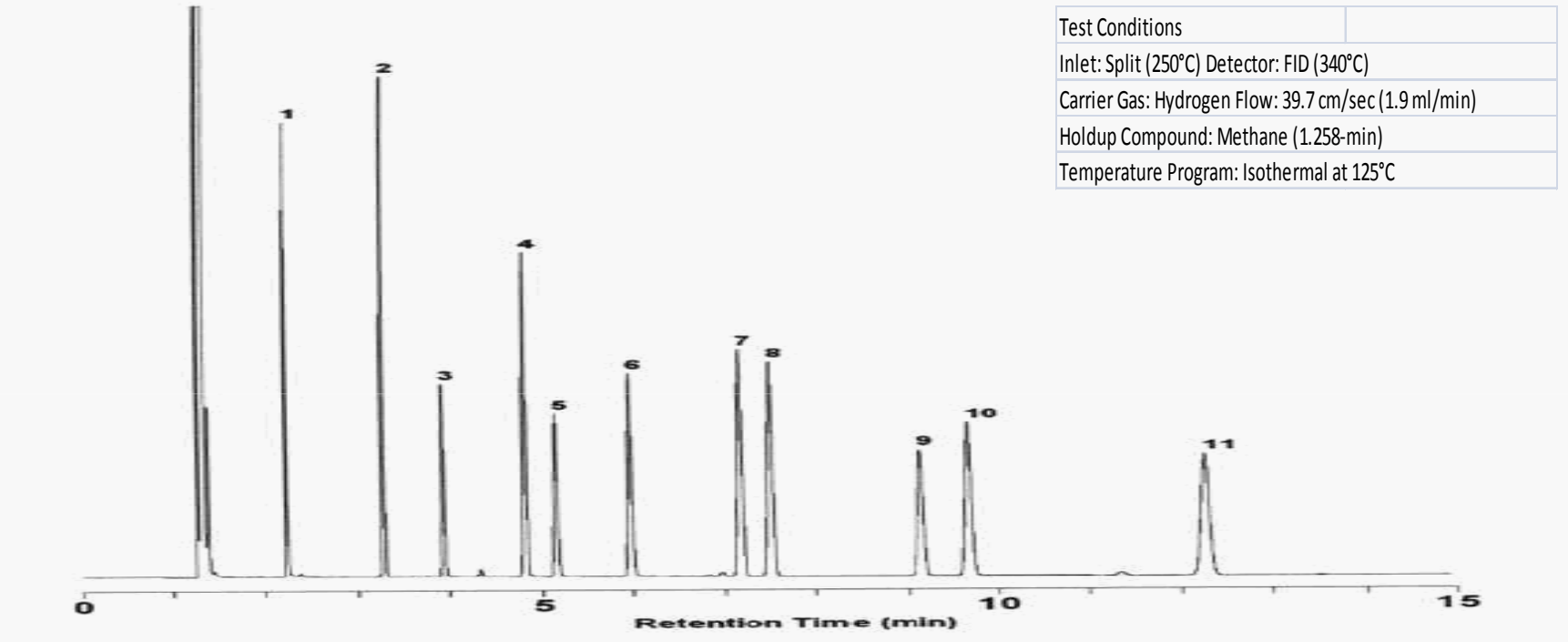
- 4 very popular liner configurations
- Splitless single taper without wool
- Splitless single taper With wool
- Split straight with wool
- Split low pressure drop single taper with wool

Convenient 5 pack in Touchless package

Individual liner in Touchless packaging

25 pack of liners in TouchLess Dispenser

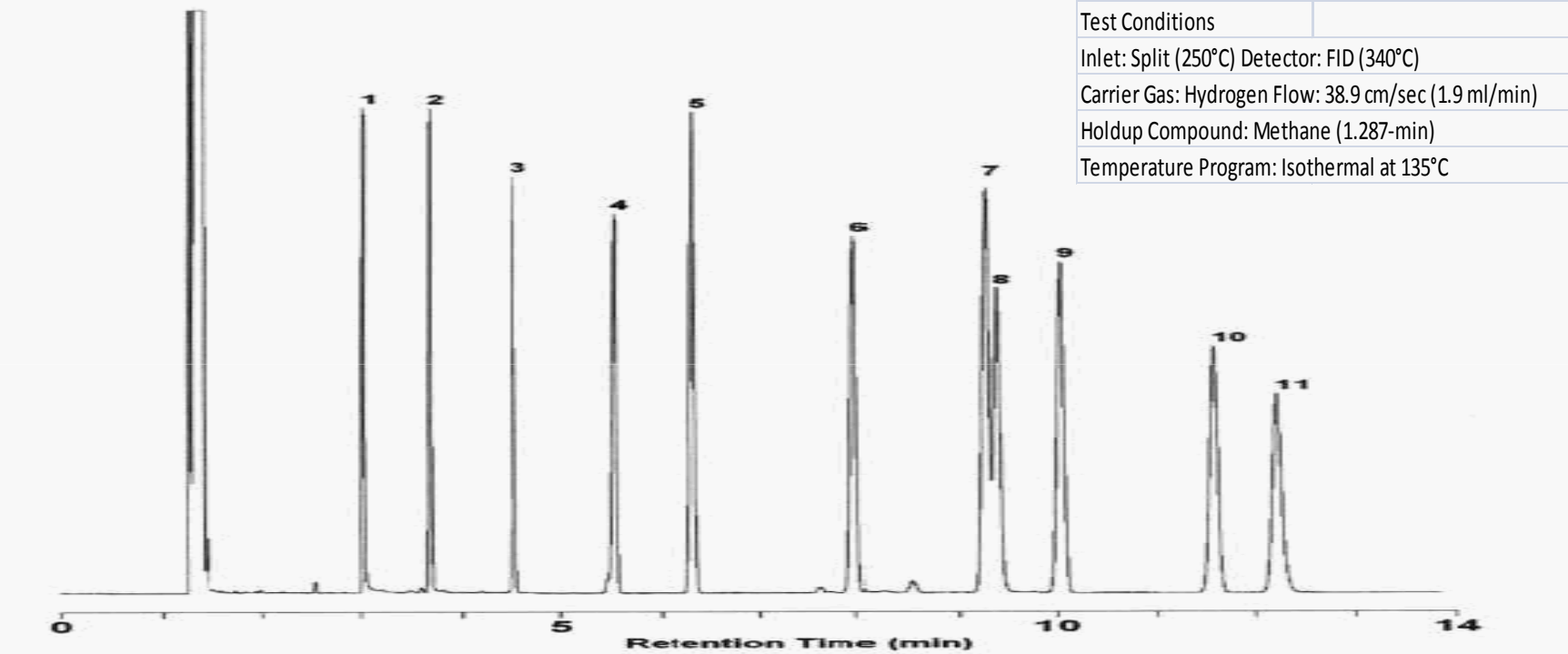
DB-CLP1 Example Test Chromatogram



Test Conditions
Inlet: Split (250°C) Detector: FID (340°C)
Carrier Gas: Hydrogen Flow: 39.7 cm/sec (1.9 ml/min)
Holdup Compound: Methane (1.258-min)
Temperature Program: Isothermal at 125°C

1. BENZYLAMINE
2. TRIDECANE
3. 4-CHLOROPHENOL
4. TETRADECANE
5. DICHLORVOS
6. 1-UNDECANOL
7. EPTC
8. PENTADECANE
9. 1,2,3,4-TETRACHLOROBENZENE
10. BIPHENYL
11. HEXADECANE

DB-CLP2 example Test chromatogram



Test Conditions	
Inlet: Split (250°C) Detector: FID (340°C)	
Carrier Gas: Hydrogen Flow: 38.9 cm/sec (1.9 ml/min)	
Holdup Compound: Methane (1.287-min)	
Temperature Program: Isothermal at 135°C	

1. 2-ETHYLHEXANOIC ACID
2. 1,6-HEXANEDIOL
3. 4-CHLOROPHENOL
4. DICHLORVOS
5. TRIDECANE
6. 2-METHYLNAPHTHALENE
7. EPTC
8. 1-UNDECANOL
9. TETRADECANE
10. 1,2,3,4-TETRACHLOROBENZENE
11. DICYCLOHEXYLAMINE

EPA Methods Covered by DB-CLP1 & DB-CLP2 columns

- **CLP Pesticides** 19 Targeted Organohalide pesticides
- **EPA 504.1** 1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP)
- **EPA 505** Organohalide pesticides
- **EPA 508.1** Chlorinated pesticides, herbicides, and organohalides
- **EPA 551** Chlorinated solvents, Trihalomethanes (THMs), and Disinfection Byproducts (DBPs)
- **EPA 552.3** Haloacetic acids and Dalapon
- **EPA 8081B (extended analyte list)** Organochlorine pesticides
- **EPA 8082A** Polychlorinated biphenyls (PCBs) and Aroclors
- **EPA 8151A** Chlorophenoxyacid herbicides

Agilent J&W DB-CLP1 and DB-CLP2 Columns

- **GC/ECD Analyses of Chlorinated Pesticides, Herbicides, Organohalides, and PCBs**
  - Contract Lab Program (CLP) targeted pesticides
  - Multiple EPA Methods
    - Testing contaminants in drinking water and groundwater
  - Dual Column analysis: Primary and Confirmation Column Sets
- **Issues**
  - Many methods use different column sets to achieve desired separation
  - Downtime of switching between different column sets for different methods
- **Solution**
  - **Agilent's J&W DB-CLP1 and DB-CLP2 column set**
    - Provides the selectivity to separate many different halogenated compounds
    - One column set is able to analyze via multiple methods

Fast CLP Pesticides

Chlorinated Pesticides

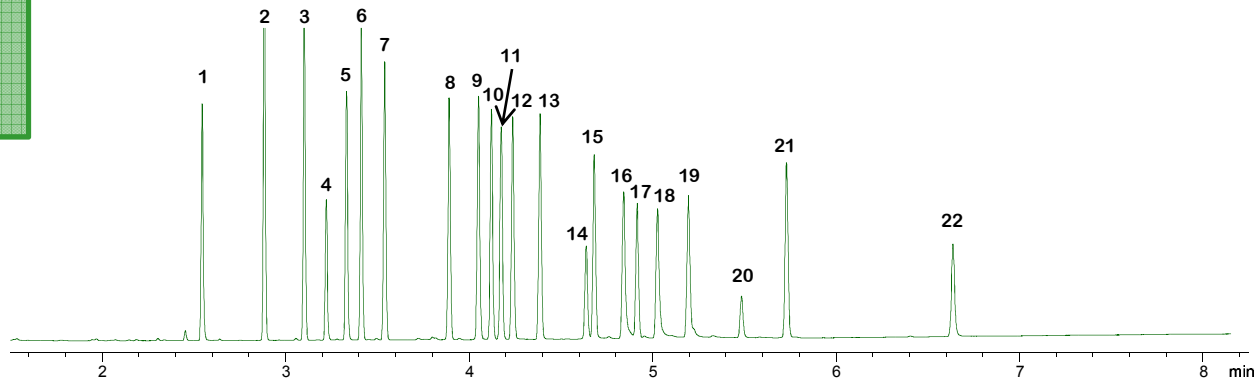
DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

Instrument:	Agilent 7890 GC with dual μECD
Sampler:	Agilent 7693
Sample:	50 ng/ mL CLP Pesticides
Inj. Vol.:	1 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	250°C
Oven Temp:	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
Carrier Gas:	Helium, constant flow 3.5 mL/ min
Detector:	µECD @340 °C

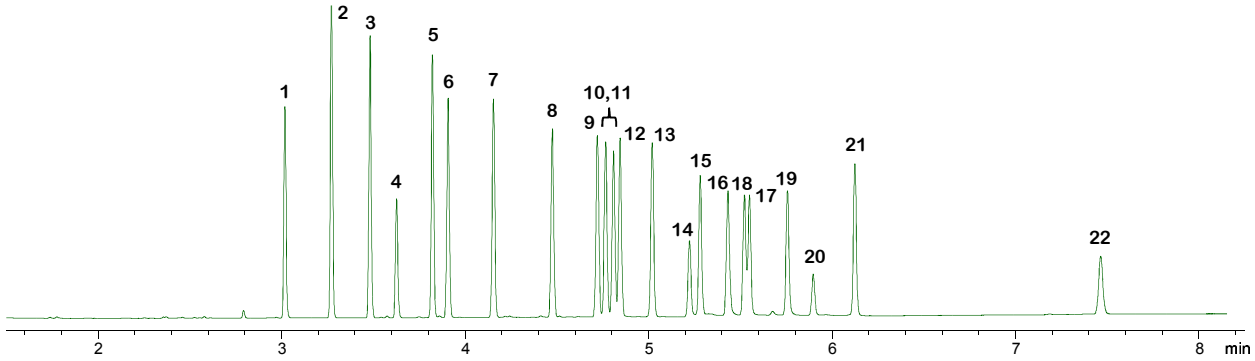
1. Tetrachloro-m-xylene*
2. α-BHC
3. γ-BHC
4. β-BHC
5. Heptachlor
6. δ-BHC
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. α-Chlordane
11. Endosulfan I
12. 4,4'-DDE
13. Dieldrin
14. Endrin
15. 4,4'-DDD
16. Endosulfan II
17. 4,4'-DDT
18. Endrin aldehyde
19. Endosulfan sulfate
20. Methoxychlor
21. Endrin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

*surrogate standard

Agilent DB-CLP1



Agilent DB-CLP2



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EPA Method 504.1

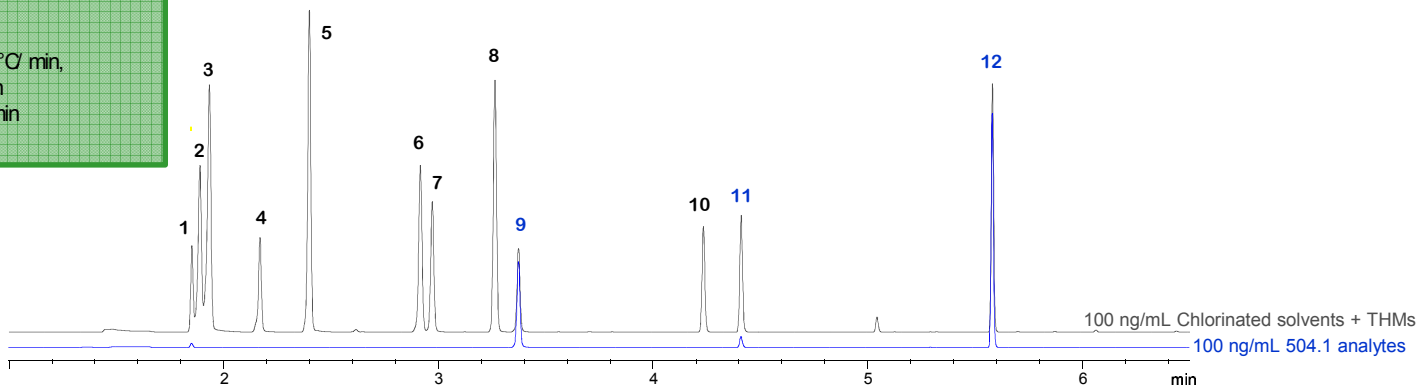
EDB, DBCP, and 123TCP

DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

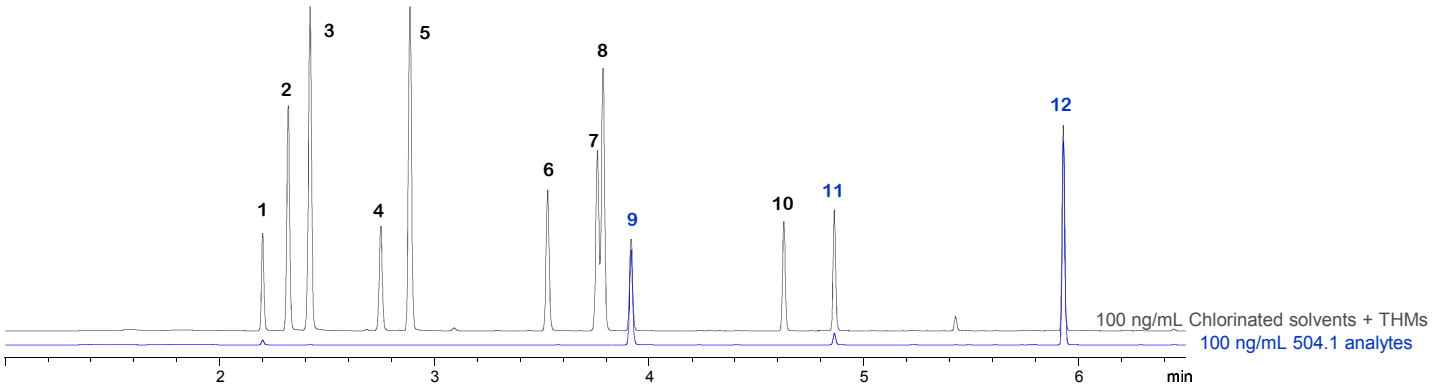
Instrument:	Agilent 7890 GC with dual μECD
Sampler:	Agilent 7693
Sample:	100 ng/ mL 504.1 analytes 100 ng/ mL Chlorinated Solvents + Trihalomethanes
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	200°C
Oven Temp:	50°C (hold 1.5 min) to 95°C at 20°C/ min, 40°C/ min to 175°C, hold 1.25 min
Carrier Gas:	Helium, constant flow 3.75 mL/ min
Detector:	µECD @300 °C

1. Chloroform
2. 1,1,1-Trichloroethane
3. Carbon tetrachloride
4. Trichloroethene
5. Bromodichlormethane
6. Tetrachloroethene
7. 1,1,2-Trichloroethane
8. Dibromochloromethane
9. **1,2-Dibromoethane (EDB)**
10. Bromoform
11. **1,2,3-Trichloropropane (123TCP)**
12. **1,2-Dibromo-3-chloropropane (DBCP)**

Agilent DB-CLP1



Agilent DB-CLP2



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EPA Method 505

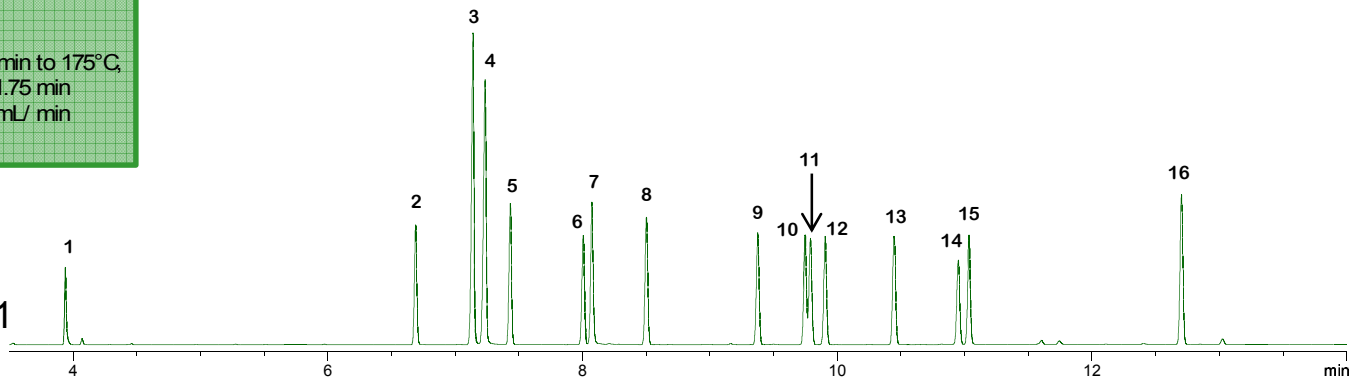
Organohalide Pesticides

DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

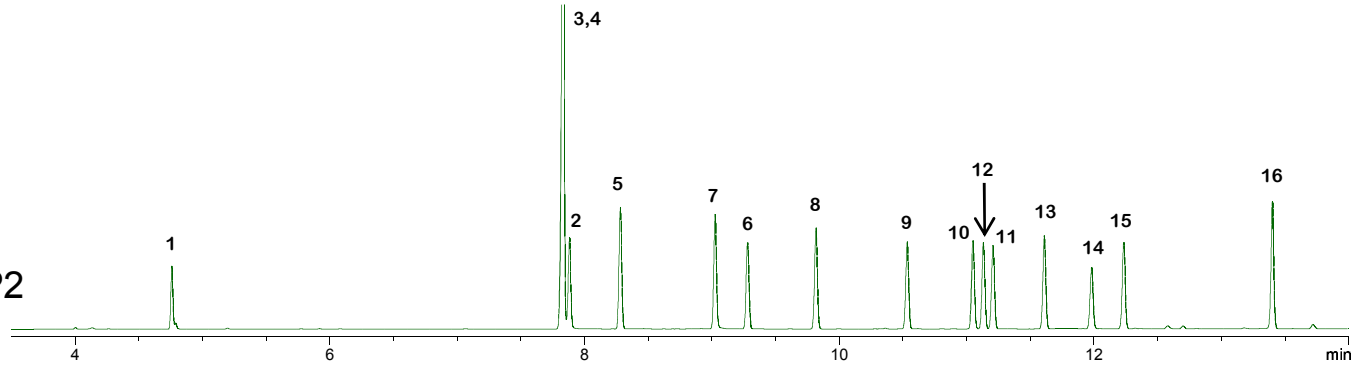
Instrument:	Agilent 7890 GC with dual μECD
Sampler:	Agilent 7873B
Sample:	100 ng/ mL 505 analytes
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert Liner double taper, splitless (cat.# 5190-3983)
Inj. Temp.:	250°C
Oven Temp:	90°C (hold 0.5 min), 35°C/ min to 175°C, 12°C/ min to 300°C, hold 1.75 min
Carrier Gas:	Helium, constant flow 2.5 mL/ min
Detector:	µECD @325 °C

1. Hexachlorocyclopentadiene
2. Hexachlorobenzene
3. Atrazine (25 µg/mL)
4. Simazine (25 µg/mL)
5. γ-BHC
6. Heptachlor
7. Alachlor (1 µg/mL)
8. Aldrin
9. Heptachlor epoxide
10. γ-Chlordane
11. trans-Nonachlor
12. α-Chlordane
13. Dieldrin
14. Endrin
15. cis-Nonachlor
16. Methoxychlor (0.5 µg/mL)

Agilent DB-CLP1



Agilent DB-CLP2



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EPA Method 508.1

Chlorinated Pesticides and Herbicides

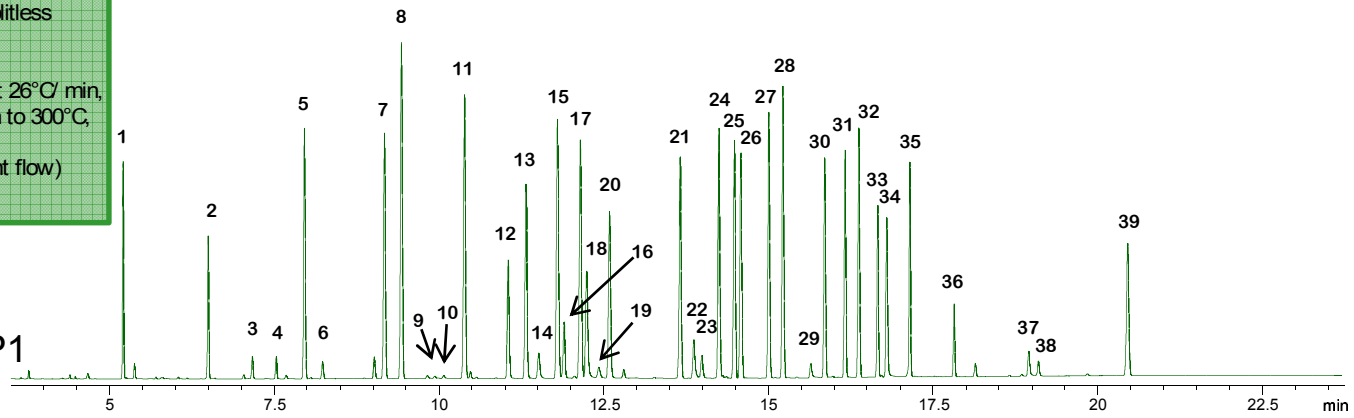
DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

Instrument:	Agilent 7890 GC with dual µECD
Sampler:	Agilent 7873B
Sample:	100 ng/ mL 508.1 analytes 100 ng/ mL Pesticide Surrogate Mix
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	250°C
Oven Temp:	80°C (hold 0.5 min) to 175°C at 26°C/ min, 6.5°C/ min to 235°C, 15°C/ min to 300°C, hold 6 min
Carrier Gas:	Helium at 35 cm/ sec (constant flow)
Detector:	µECD @340 °C

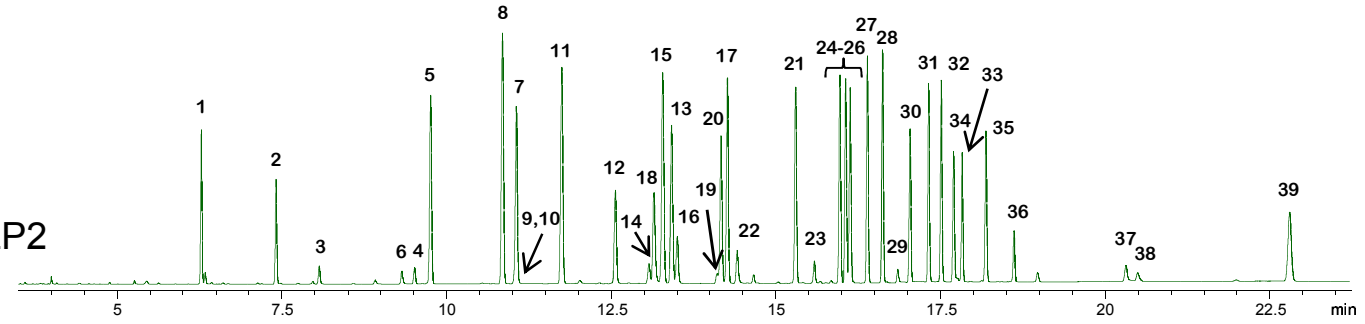
1. Hexachlorocyclopentadiene
2. Etradiazole
3. Chloroneb
4. Trifluralin
5. TCMX*
6. Propachlor
7. Hexachlorobenzene
8. α-BHC
9. Atrazine
10. Simazine
11. γ-BHC
12. β-BHC
13. Heptachlor
14. Alachlor
15. δ-BHC
16. Chlorothalonil
17. Aldrin
18. Metribuzin
19. Metolachlor
20. DCPA
21. Heptachlor epoxide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

*surrogate standard

Agilent DB-CLP1



Agilent DB-CLP2



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EPA Method 551

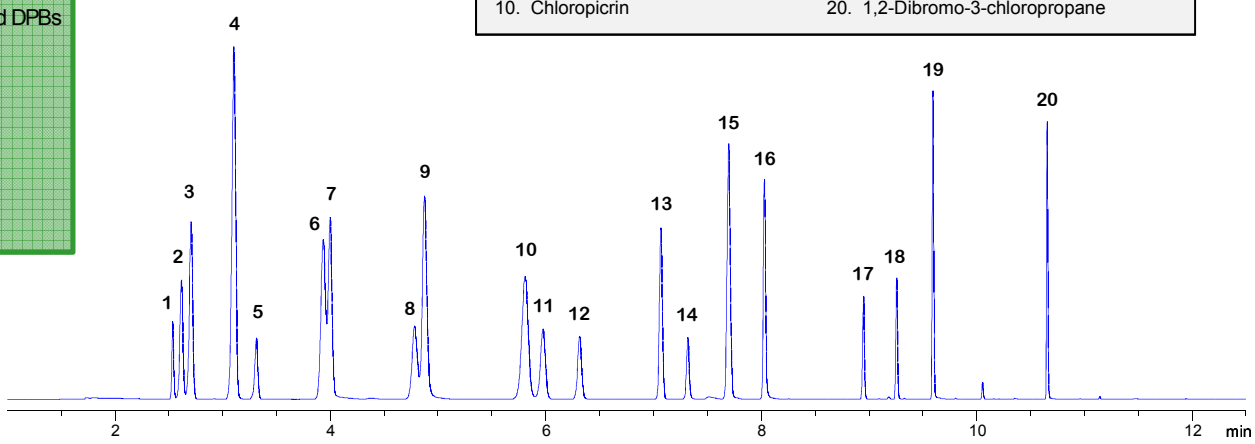
Chlorinated Solvents, THMs, and DBPs

DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

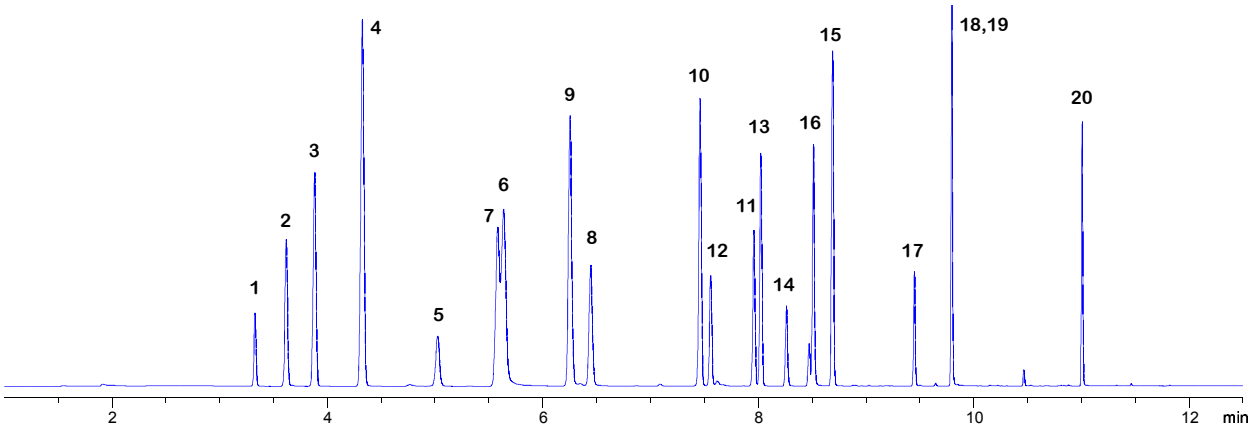
Instrument:	Agilent 7890 GC with dual μECD
Sampler:	Agilent 7693
Sample:	100 ng/ mL Chlorinated Solvents, THMs, and DPBs
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	200°C
Oven Temp:	35°C (hold 5.75 min) to 95°C at 20°C/ min, 40°C/ min to 200°C, hold 1.25 min
Carrier Gas:	Helium at 45 cm/ sec (constant flow)
Detector:	µECD @300 °C

1. Chloroform
2. 1,1,1-Trichloroethane
3. Carbon tetrachloride
4. Trichloroacetonitrile
5. Trichloroethene
6. Chloral hydrate
7. Bromodichloromethane
8. 1,1-Dichloro-2-propanone
9. Dichloroacetonitrlie
10. Chloropicrin
11. Tetrachloroethene
12. 1,1,2-Trichloroethane
13. Dibromochloromethane
14. 1,2-Dibromoethane
15. 1,1,1-Trichloro-2-propanone
16. Bromochloroacetonitrile
17. Bromoform
18. 1,2,3-Trichloropropane
19. Dibromoacetonitrile
20. 1,2-Dibromo-3-chloropropane

Agilent DB-CLP1



Agilent DB-CLP2



Agilent Technologies

EPA Method 552.3

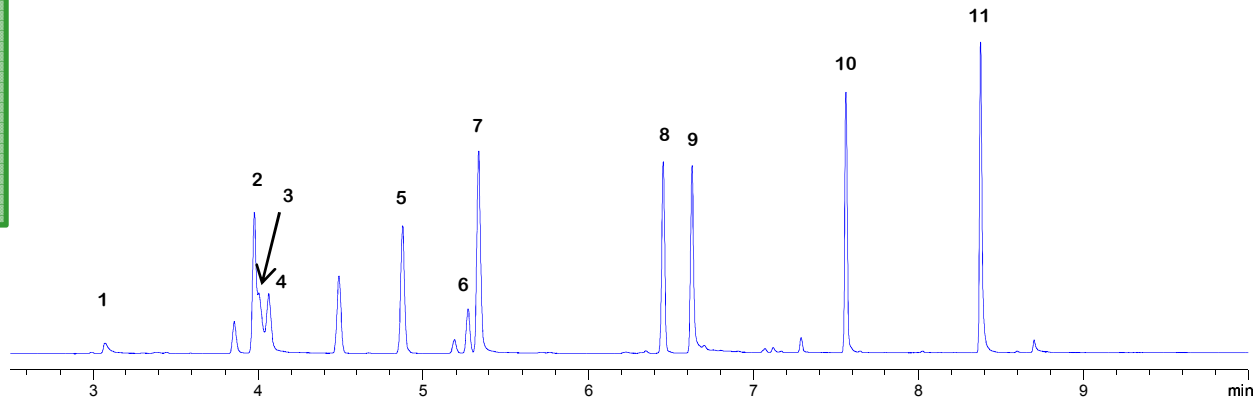
Haloacetic Acids and Dalapon

DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

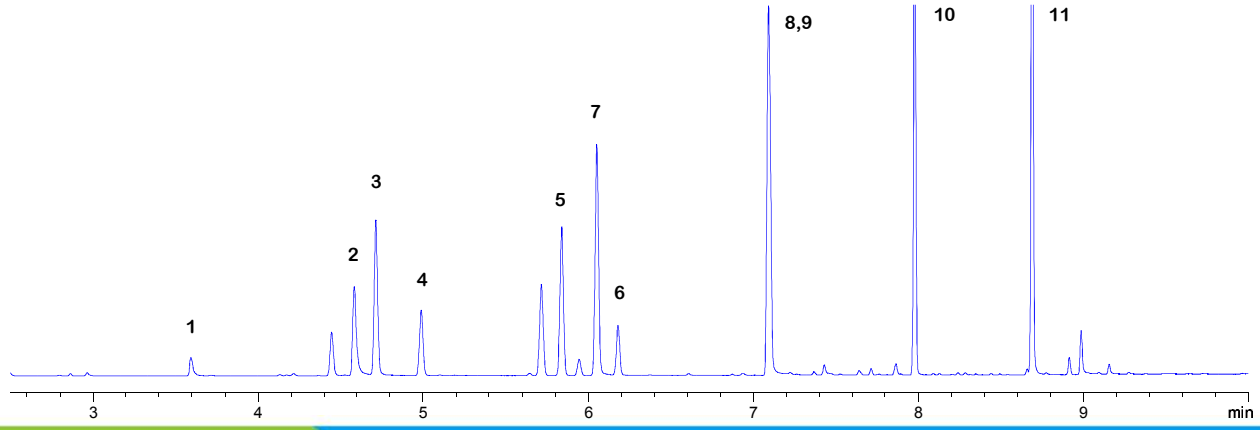
Instrument:	Agilent 7890 GC with dual μECD
Sampler:	Agilent 7693
Sample:	10-100 ng/ mL Haloacetic acids and Dalapon (methyl esters)
Inj. Vol.:	1 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	180°C
Oven Temp:	40°C (hold 0.5 min) to 95°C at 10°C/ min, 30°C/ min to 200°C, hold 1 min
Carrier Gas:	Helium at 54.79 cm/ sec (constant flow)
Detector:	µECD @340 °C

1. Methyl chloroacetate (30ng/mL)
2. Methyl bromoacetate (20ng/mL)
3. Methyl dichloroacetate (30ng/mL)
4. Dalapon methyl ester (20ng/mL)
5. Methyl trichloroacetate (10ng/mL)
6. 1,2,3-Trichloropropane (IS) (50ng/mL)
7. Methyl bromochloroacetate (20ng/mL)
8. Methyl bromodichloroacetate (20ng/mL)
9. Methyl dibromoacetate (10ng/mL)
10. Methyl dibromochloroacetate (50ng/mL)
11. Methyl tribromoacetate (100ng/mL)

Agilent DB-CLP1



Agilent DB-CLP2



Agilent Technologies

EPA Method 8081B (extended)

Organochlorine Pesticides

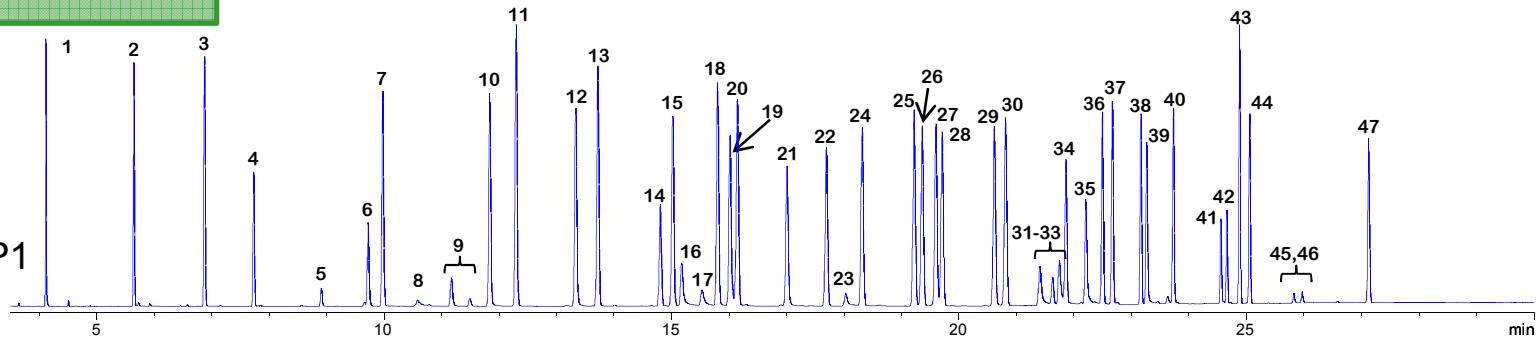
DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

Instrument:	Agilent 7890 GC with dual $_{\mu}$ECD
Sampler:	Agilent 7693
Sample:	50 ng/ mL 8081B analytes
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	250°C
Oven Temp:	80°C (hold 0.5 min) to 150°C at 20°C/ min, 5°C/ min to 235°C, 15°C/ min to 300°C, hold 5 min
Carrier Gas:	Helium at 43.5 cm/ sec (constant flow)
Detector:	µECD @325 °C

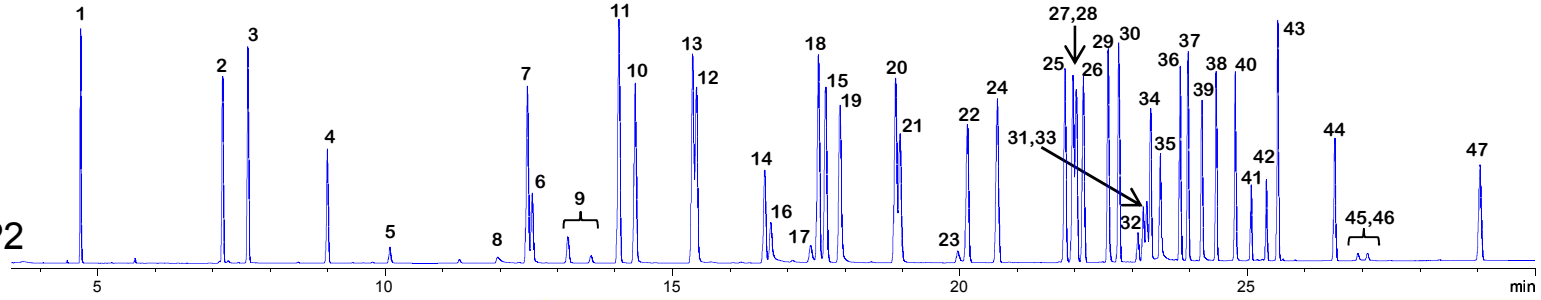
1. 1,2-Dibromo-3-chloropropane
2. Hexachlorocyclopentadiene
3. 1-Bromo-2-nitrobenzene
4. Etradiazole
5. Chloroneb
6. Trifluralin
7. TCMX*
8. Propachlor
9. Diallate isomers (250ng/mL)
10. Hexachlorobenzene
11. α-BHC
12. Pentachloronitrobenzene
13. γ-BHC
14. β-BHC
15. Heptachlor
16. Dichlone
17. Alachlor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

surrogate standard

Agilent DB-CLP1



Agilent DB-CLP2



Agilent Technologies

EPA Method 8082A

PCB Congeners

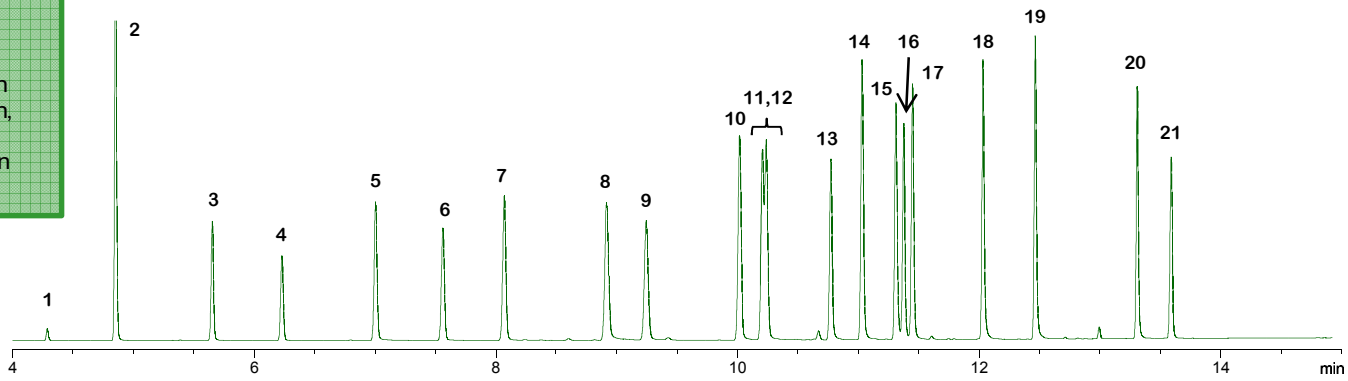
DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

Instrument:	Agilent 7890 GC with dual $_{\mu}$ECD
Sampler:	Agilent 7693
Sample:	100 ng/ mL PCB congeners 100 ng/ mL Pesticide Surrogate Mix
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	250°C
Oven Temp:	125°C (hold 0.25 min), 20°C/ min to 210°C, hold 0.5 min 7°C/ min to 235°C, hold 0.75 min, 25°C/ min to 325°C, hold 2 min,
Carrier Gas:	Helium, constant flow 3 mL/ min
Detector:	µECD @340 °C

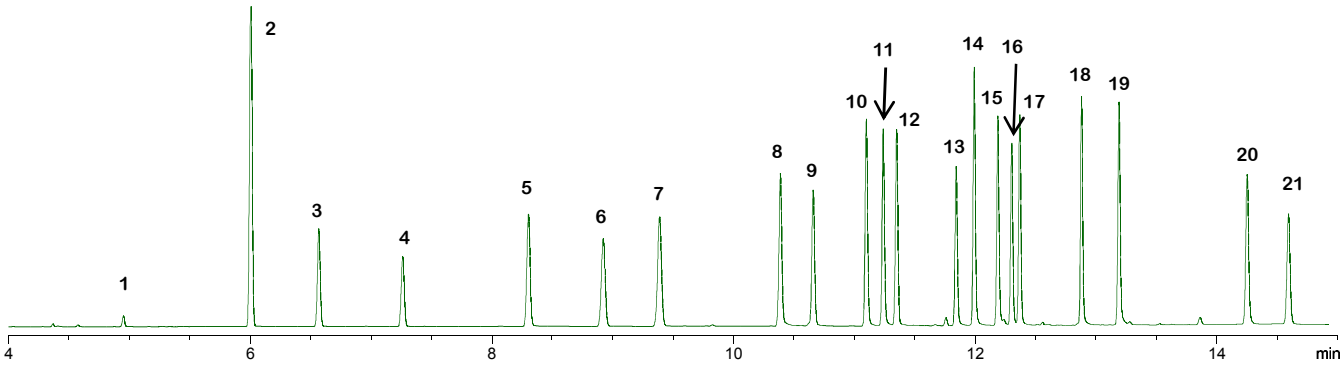
1. BZ #1
2. TCMX*
3. BZ #5
4. BZ #18
5. BZ #31
6. BZ #52
7. BZ #44
8. BZ #66
9. BZ #101
10. BZ #87
11. BZ #110
12. BZ #151
13. BZ #153
14. BZ #141
15. BZ #138
16. BZ #187
17. BZ #183
18. BZ #180
19. BZ #170
20. BZ #206
21. Decachlorobiphenyl*

surrogate standard

Agilent DB-CLP1



Agilent DB-CLP2



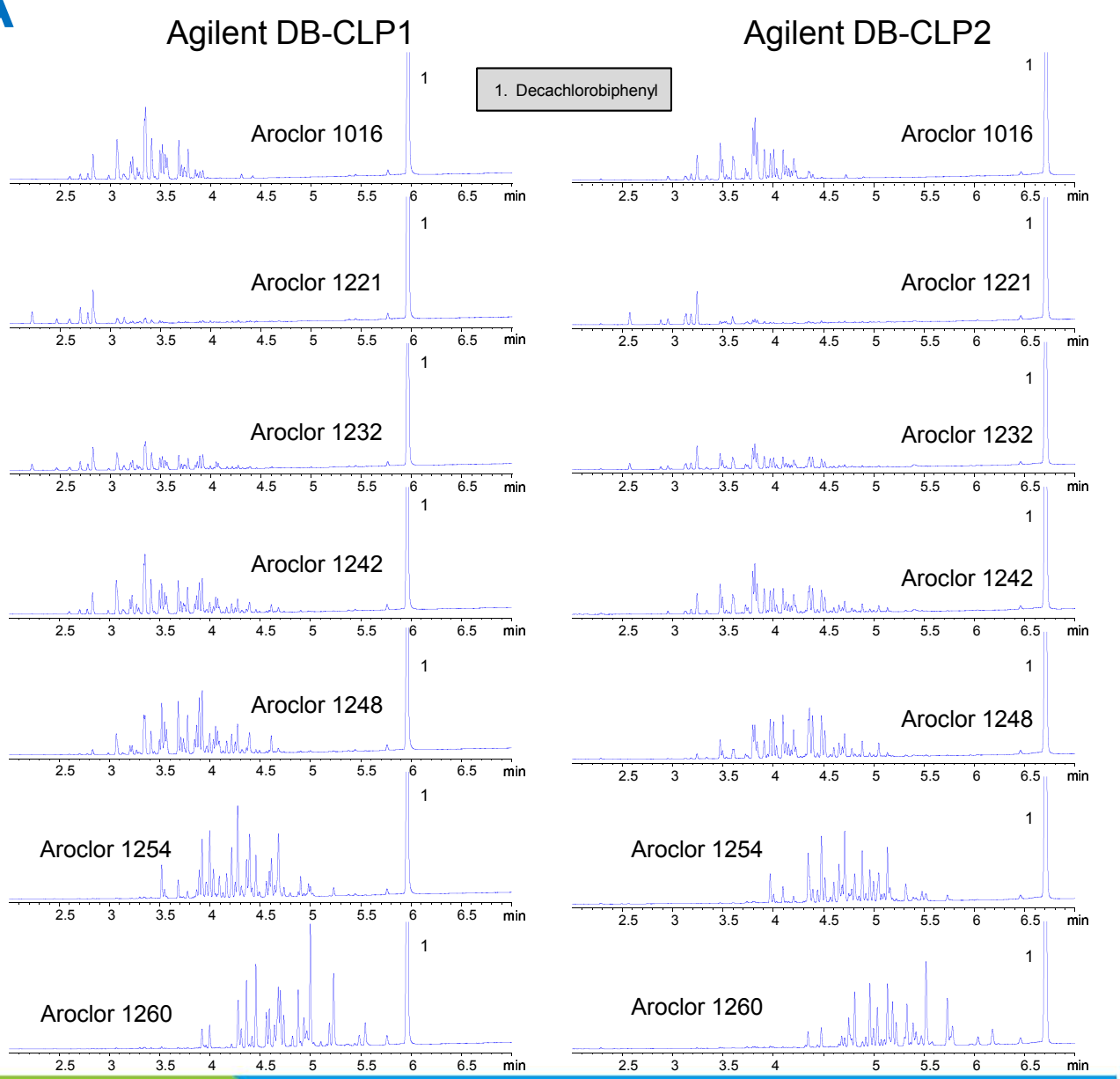
Agilent Technologies

EPA Method 8082A

Aroclors

DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

Instrument:	Agilent 7890 GC with dual $_{\mu}$ECD
Sampler:	Agilent 7693
Sample:	100 ng/ mL Individual Aroclor 100 ng/ mL Decachlorobiphenyl
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	250°C
Oven Temp:	160°C (hold 0.25 min), 35°C/ min to 330°C, hold 3 min
Carrier Gas:	Helium, constant flow 3.75 mL/ min
Detector:	µECD @340 °C



Agilent Technologies

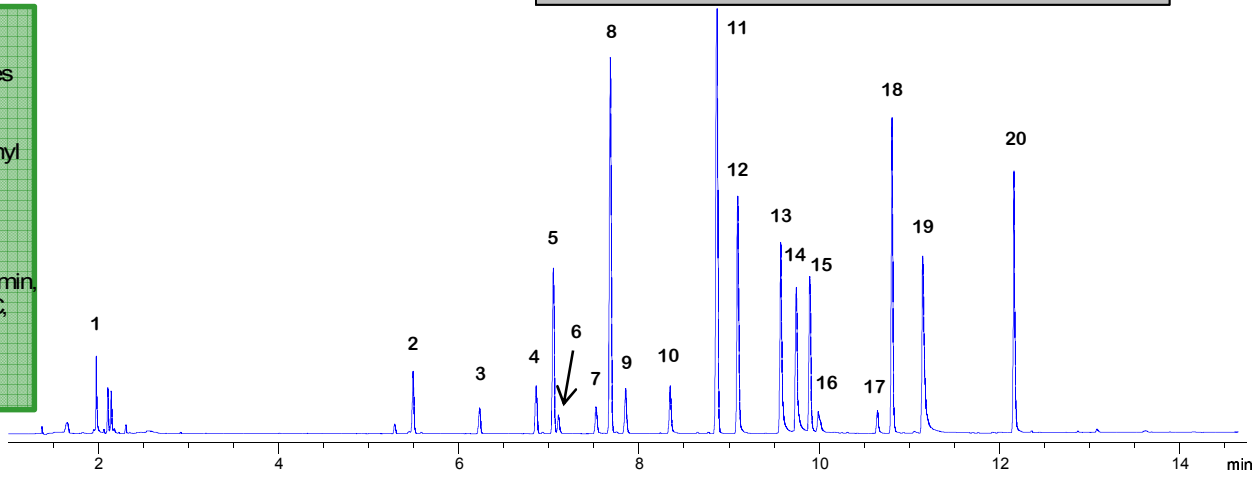
EPA Method 8151A

Chlorophenoxyacid Herbicides

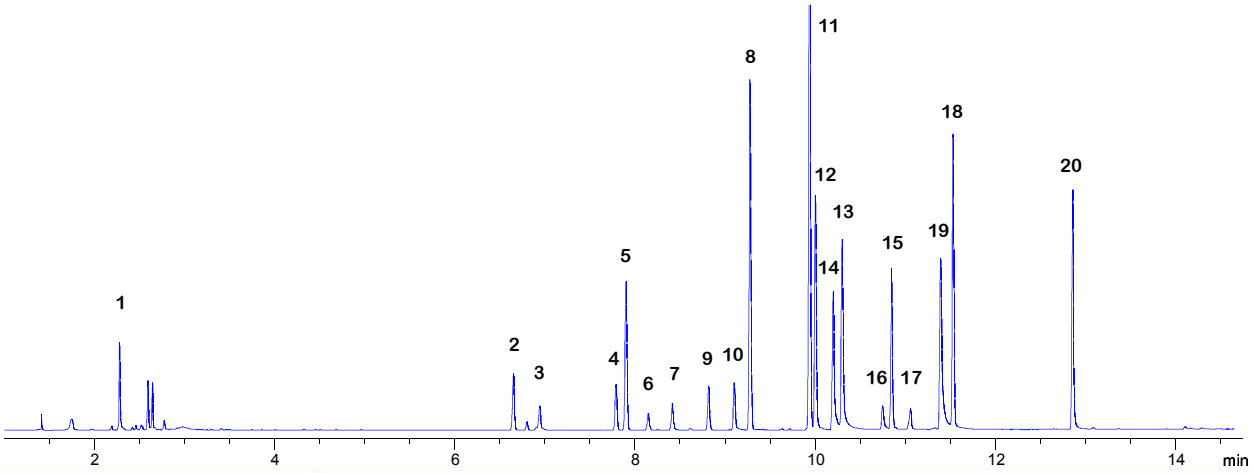
1.	Dalapon methyl ester
2.	3,5-dichlorobenzoic acid methyl ester
3.	4-Nitroanisole
4.	DCAA methyl ester (SS)
5.	Dicamba methyl ester
6.	MCPP methyl ester
7.	MCPA methyl ester
8.	4,4'-DBOB (IS)
9.	Dichlorprop methyl ester
10.	2,4-D methyl ester
11.	Pentachloroanisole
12.	2,4,5-TP methyl ester
13.	2,4,5-T methyl ester
14.	Chloramben methyl ester
15.	Dinoseb methyl ester
16.	2,4-DB methyl ester
17.	Bentazon methyl ester
18.	DCPA methyl ester
19.	Picloram methyl ester
20.	Acifluorfen methyl ester

DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

Instrument:	Agilent 7890 GC with dual µECD
Sampler:	Agilent 7693
Sample:	50 ng/ mL Chlorophenoxyacid Herbicides (methyl esters) 50 ng/ mL DCAA methyl ester 50 ng/ mL 4,4'-Dibromooctafluorobiphenyl
Inj. Vol.:	2 µL splitless
Liner:	Ultra Inert liner, single taper splitless (cat.# 5190-2292)
Inj. Temp.:	250°C
Oven Temp:	85°C (hold 0.25 min) to 135°C at 25°C/ min, 11°C/ min to 200°C, 20°C/ min to 300°C, hold 1.5 min
Carrier Gas:	Helium, constant flow 3 mL/ min
Detector:	µECD @325 °C



Agilent DB-CLP1



Agilent DB-CLP2

Agilent Technologies

Summary

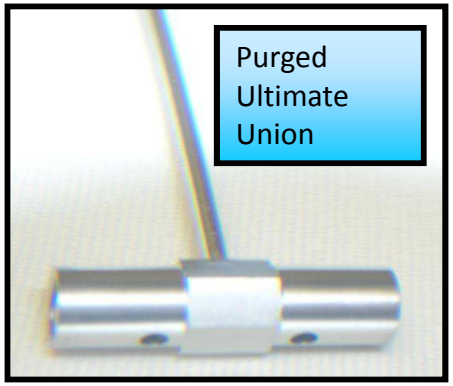
- DB-UI8270D columns for semi-volatile analysis
  - Specifically tested for optimal semi-volatile selectivity and inertness performance

- DB-CLP1 and DB-CLP2 columns for dual ECD methods
  - Specifically tested for optimal CLP method performance, cover 9 EPA methods

Additional productivity enhancing tools work for both semi-volatiles and CLP methods

Additional productivity enhancing tools

- Free method translation software
- Ultra Inert Liners with “touch-less packaging”
- Gas Clean filters
- CFT fittings and devices
- Turn key analyzer solutions



More Useful References

Application Note: 5990-0207EN Organohalide Pesticides in Water by GC/μECD with Agilent J&W DB-CLP1 and DB0CLP2

Application Note: 5991-0541EN Rapid Analysis of CLP Pesticides Using High-Temperature Agilent J&W DB-CLP-1 and DB-CLP2 Columns

Application Note: 5991-0615EN Evaluating CLP and EPA Methods for Pesticides in Water Using Agilent J&W DB-CLP1/DB-CLP2 GC Columns

Agilent J&W Column Selection Guide 5990-9867EN

Stop back to our website often for the latest updates

New Tools for Success

- **Agilent's J&W DB-8270D**
  - Designed and tested for optimal semi-volatile analysis performance
- **Agilent's J&W DB-CLP1 and DB-CLP2 column set**
  - Analyze nine EPA methods along with CLP pesticides without changing column sets
  - Increase sample throughput with faster analysis times
- **Flow-path productivity enhancing for all**

Questions?

Agilent Technologies