

New Application Specific Columns

Simon Jones
GC columns Application Engineer

What Columns are New?

DB-CLP1

DB-CLP2

DB-UI 8270D



Environmental

DB-Select 624 UI 467

— US Pharmacopeia

What are the Benefits?

Address specific issues with certain methods

Response

Tailing factor

Resolution

Named for easier identification

DB-CLP1 & DB-CLP2

What are they?

Contract Laboratory Pesticides

Why 2 columns?

Dual column method (μ ECD)

Primary and Confirmatory columns

Pesticides are active compounds!

Response, peak shape, tailing, breakdown

DB-CLP1/CLP2

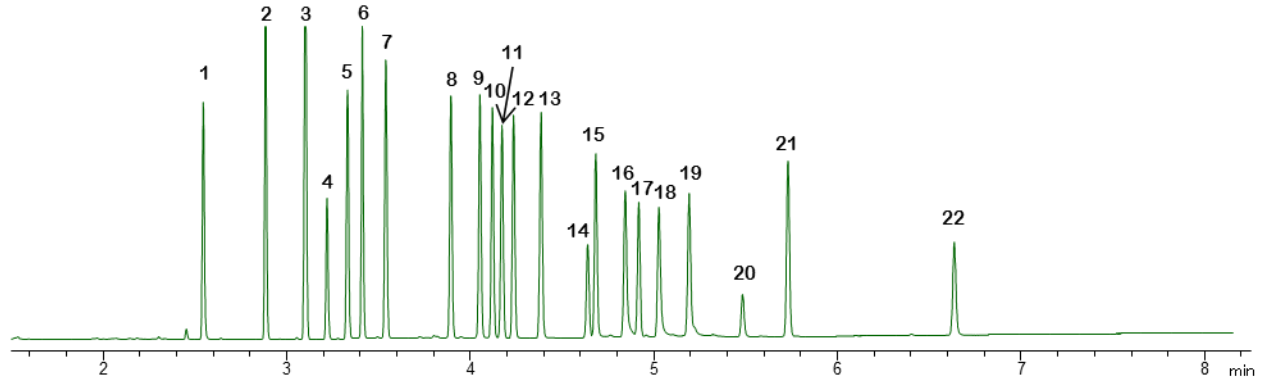
CLP Pesticides

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

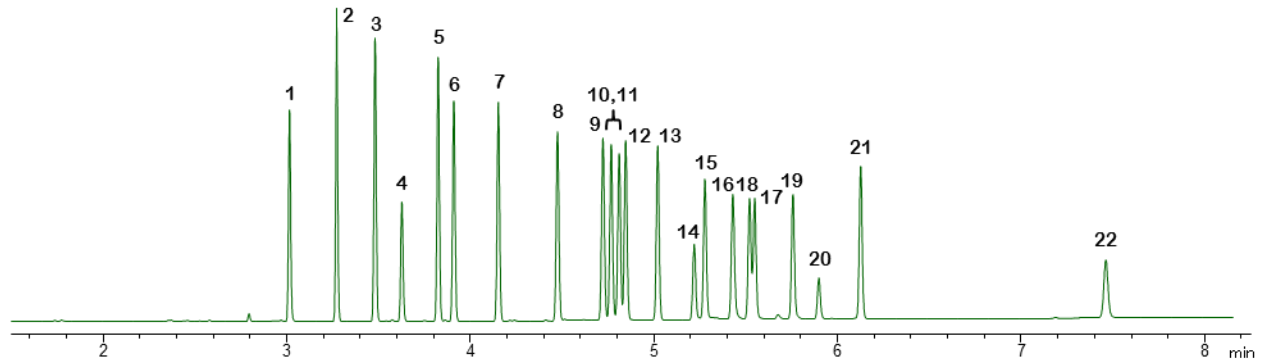
Instrument: Agilent 7890 GC with dual µECD
 Sampler: Agilent 7693
 Sample: 50 ng/mL CLP Pesticides
 Inj. Vol.: 1 µL splitless
 Liner: Ultra Inert liner, single taper splitless
 (cat.#5190-2292)
 Inj. Temp.: 250°C
 Oven Temp: 150°C (hold 0.2 min),
 45°C/min to 250°C, 18°C/min to 300°C,
 30°C/min to 330°C, hold 2.5 min
 Carrier Gas: Helium, constant flow 3.5 mL/min
 Detector: µECD @ 340 °C

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

Agilent DB-CLP1



Agilent DB-CLP2



DB-CLP1/DB-CLP2

Additional Methods

EPA 504.1 - 1,2-dibromoethane (EDB), 1,2-dibromo-3-chloropropane (DBCP), and 1,2,3-trichloropropane

EPA 505 – organohalides

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

EPA Method 504.1

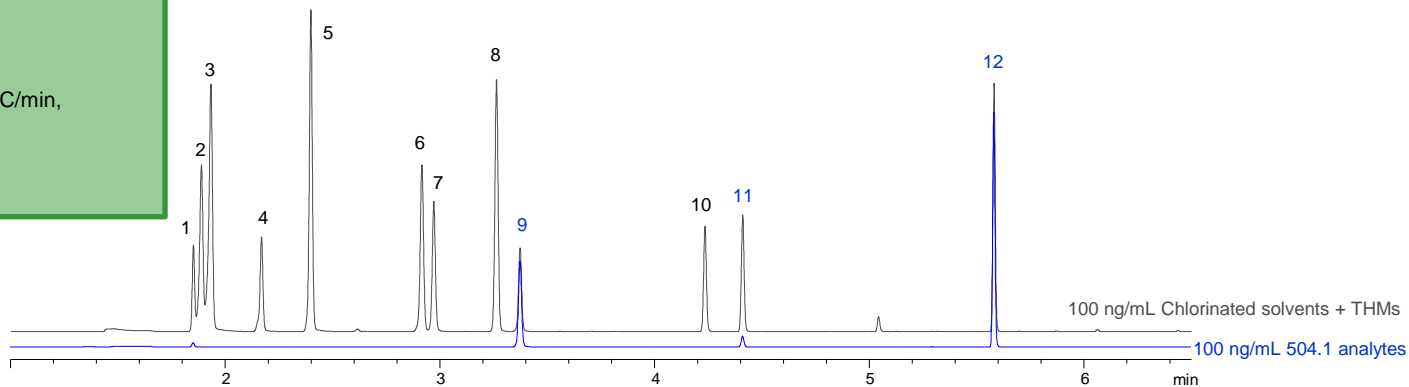
EDB, DBCP, and 123TCP

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

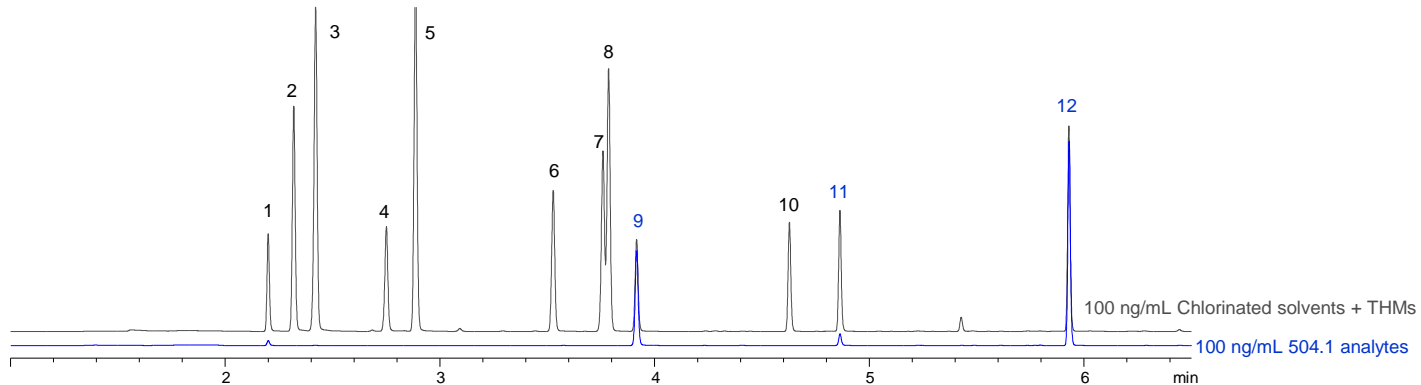
Instrument: Agilent 7890 GC with dual µECD
Sampler: Agilent 7693
Sample: 100 ng/mL 504.1 analytes
100 ng/mL Chlorinated Solvents + THMs
Inj. Vol.: 2 µL splitless
Liner: Ultra Inert liner, single taper splitless
(cat.#5190-2292)
Inj. Temp.: 200°C
Oven Temp: 50°C (hold 1.5 min) to 95°C at 20°C/min,
40°C/min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

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

Agilent DB-CLP1



Agilent DB-CLP2



EPA Method 505

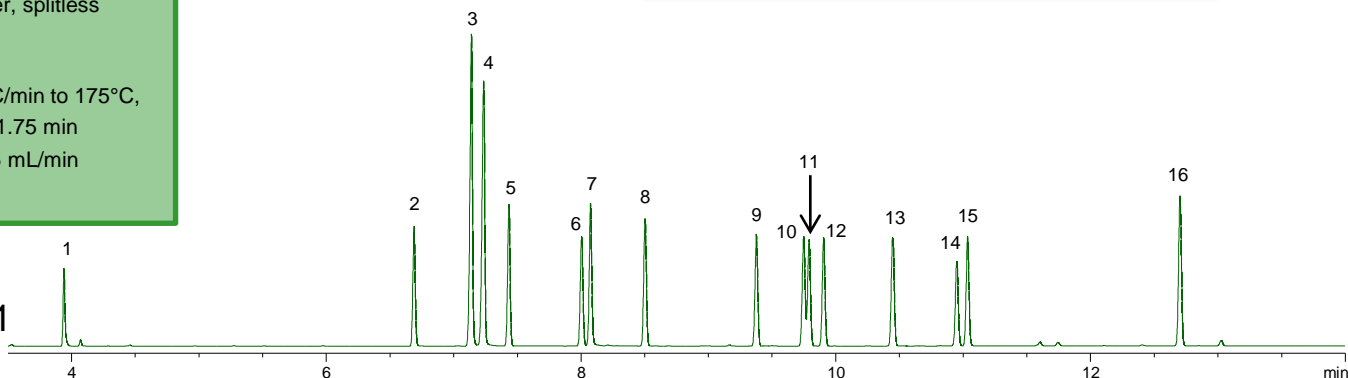
Organohalide Pesticides

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

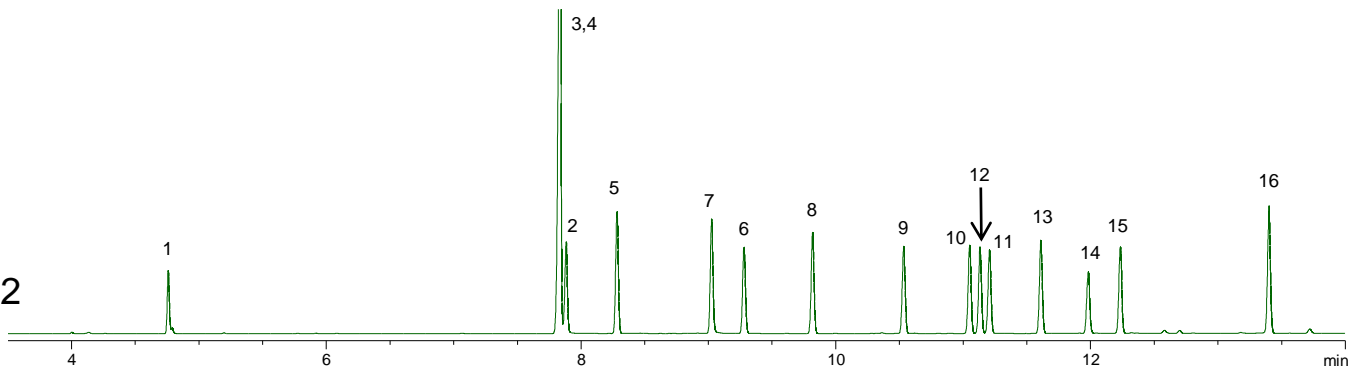
Instrument: Agilent 7890 GC with dual µECD
Sampler: Agilent 7873B
Sample: 100 ng/mL 505 analytes
Inj. Vol.: 2 µL splitless
Liner: Ultra Inert Liner double taper, splitless
(cat.# 5190-3983)
Inj. Temp.: 250°C
Oven Temp: 90°C (hold 0.5 min), 35°C/min to 175°C,
12°C/min to 300°C, hold 1.75 min
Carrier Gas: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

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

Agilent DB-CLP1



Agilent DB-CLP2



EPA Method 508.1

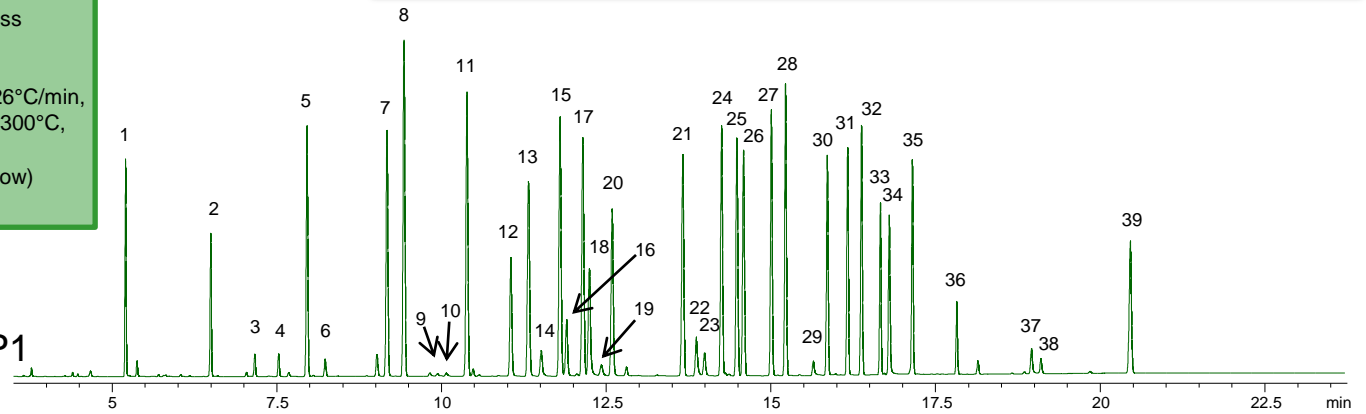
Chlorinated Pesticides and Herbicides

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

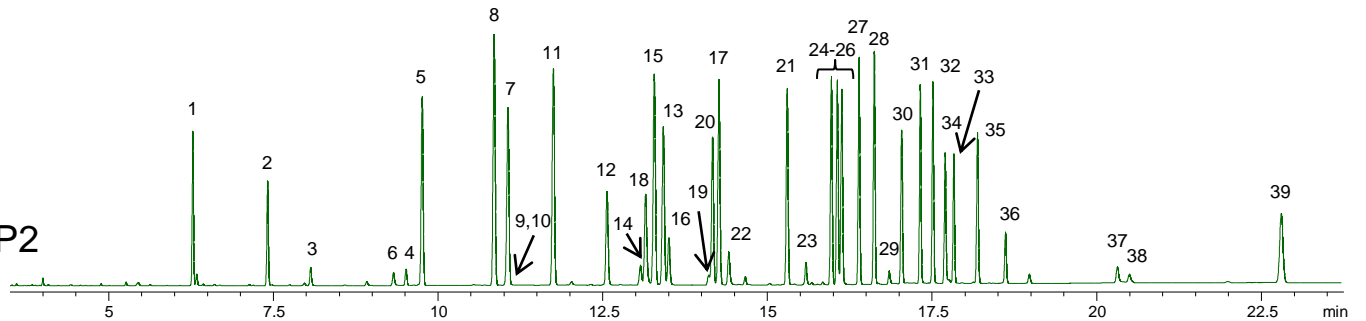
Instrument: Agilent 7890 GC with dual μ ECD
 Sampler: Agilent 7873B
 Sample: 100 ng/mL 508.1 analytes
 100 ng/mL Pesticide Surrogate Mix
 Inj. Vol.: 2 μ L splitless
 Liner: Ultra Inert liner, single taper splitless
 (cat.#5190-2292)
 Inj. Temp.: 250°C
 Oven Temp: 80°C (hold 0.5 min) to 175°C at 26°C/min,
 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: μ ECD @ 340 °C

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

Agilent DB-CLP1



Agilent DB-CLP2



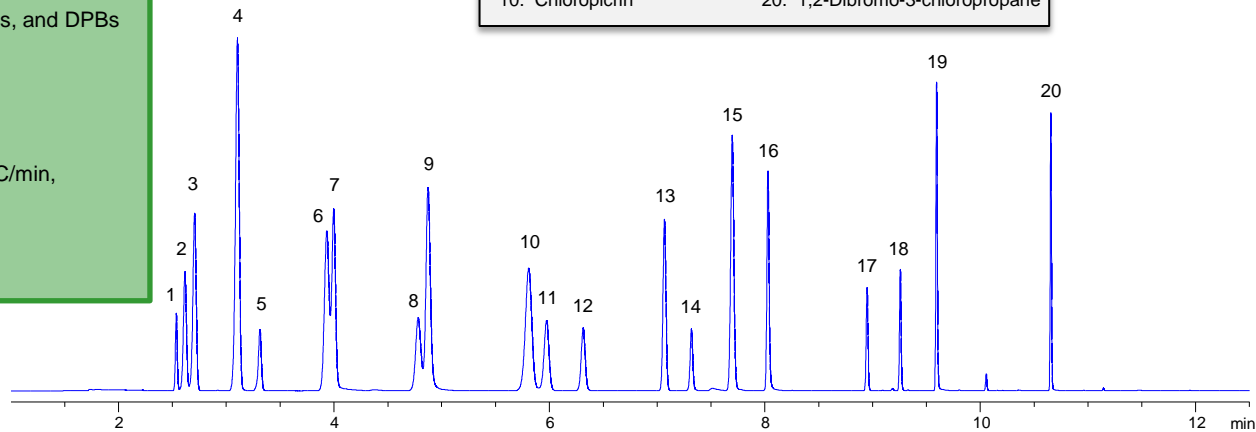
EPA Method 551

Chlorinated Solvents, THMs, and DBPs

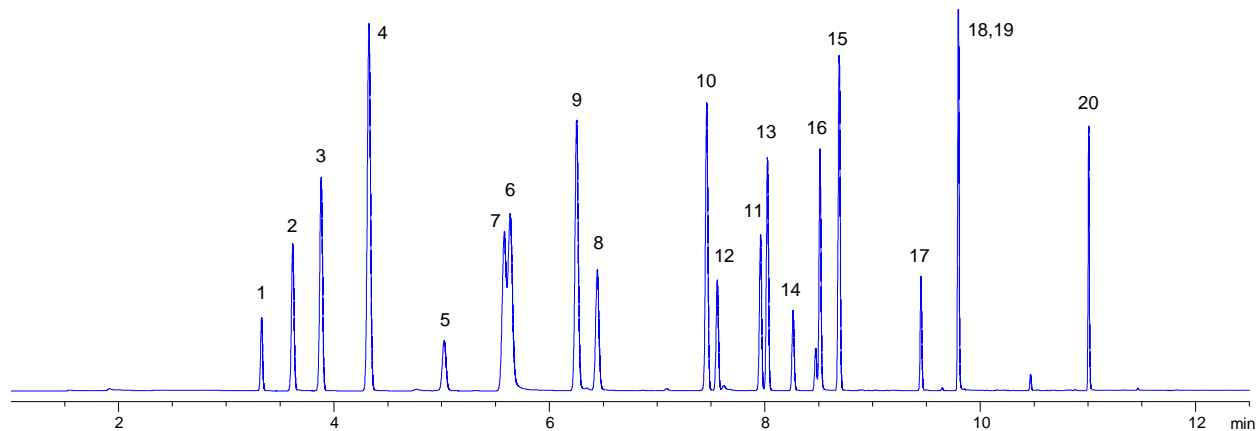
DB-CLP1 30m 0.32mm ID 0.25µm (cat.# 123-8232)
DB-CLP2 30m 0.32mm ID 0.5µm (cat.# 123-8336)
5m x 0.32mm ID deact. guard column
Inert Tee CFT device (cat.# G3184-60065) 1:1 Split

Instrument: Agilent 7890 GC with dual µECD
Sampler: Agilent 7693
Sample: 100 ng/mL Chlorinated Solvents, THMs, and DBPs
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 | 11. Tetrachloroethene |
| 2. 1,1,1-Trichloroethane | 12. 1,1,2-Trichloroethane |
| 3. Carbon tetrachloride | 13. Dibromochloromethane |
| 4. Trichloroacetonitrile | 14. 1,2-Dibromoethane |
| 5. Trichloroethene | 15. 1,1,1-Trichloro-2-propanone |
| 6. Chloral hydrate | 16. Bromochloroacetonitrile |
| 7. Bromodichloromethane | 17. Bromoform |
| 8. 1,1-Dichloro-2-propanone | 18. 1,2,3-Trichloropropane |
| 9. Dichloroacetonitrile | 19. Dibromoacetonitrile |
| 10. Chloropicrin | 20. 1,2-Dibromo-3-chloropropane |



Agilent DB-CLP1



Agilent DB-CLP2

EPA Method 552.3

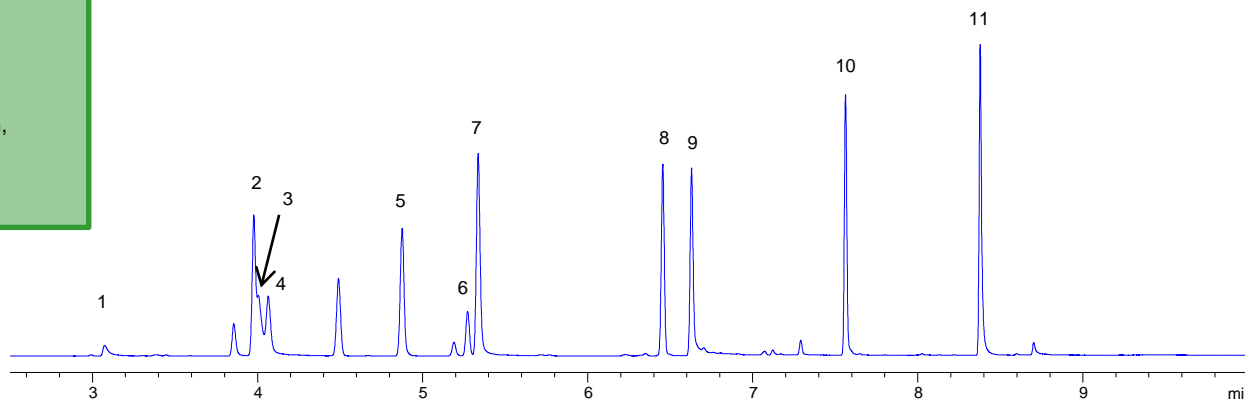
Haloacetic Acids and Dalapon

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

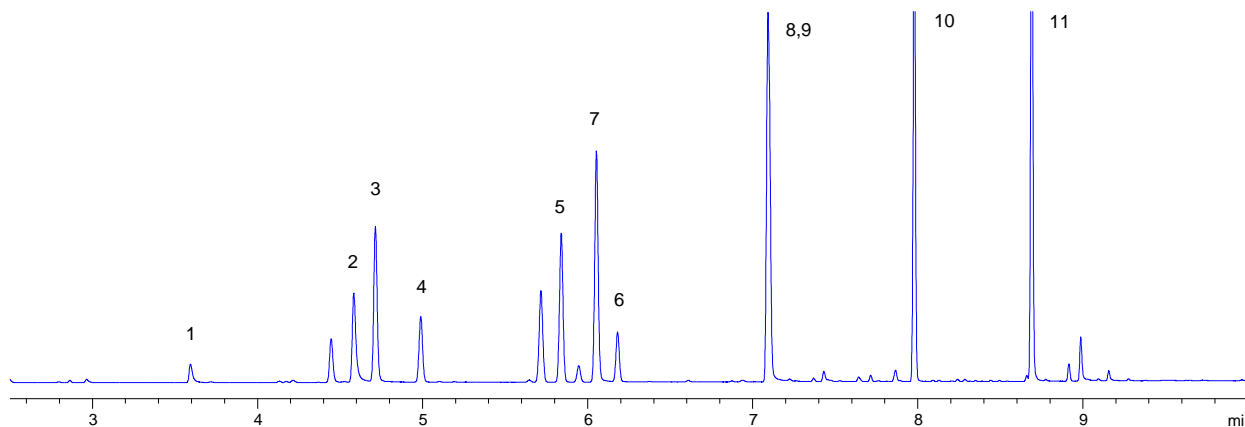
Instrument: Agilent 7890 GC with dual µECD
 Sampler: Agilent 7693
 Sample: 10-100 ng/mL Haloacetic acids and Dalapon (methyl esters)
 Inj. Vol.: 1 µL splitless
 Liner: Ultra Inert liner, single taper splitless (cat.#5190-2292)
 Inj. Temp.: 180°C
 Oven Temp: 40°C (hold 0.5 min) to 95°C at 10°C/min, 30°C/min 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) | 7. Methyl bromochloroacetate (20ng/mL) |
| 2. Methyl bromoacetate (20ng/mL) | 8. Methyl bromodichloroacetate (20ng/mL) |
| 3. Methyl dichloroacetate (30ng/mL) | 9. Methyl dibromoacetate (10ng/mL) |
| 4. Dalapon methyl ester (20ng/mL) | 10. Methyl dibromochloroacetate (50ng/mL) |
| 5. Methyl trichloroacetate (10ng/mL) | 11. Methyl tribromoacetate (100ng/mL) |
| 6. 1,2,3-Trichloropropane (IS) (50ng/mL) | |

Agilent DB-CLP1



Agilent DB-CLP2



EPA Method 8081B (extended)

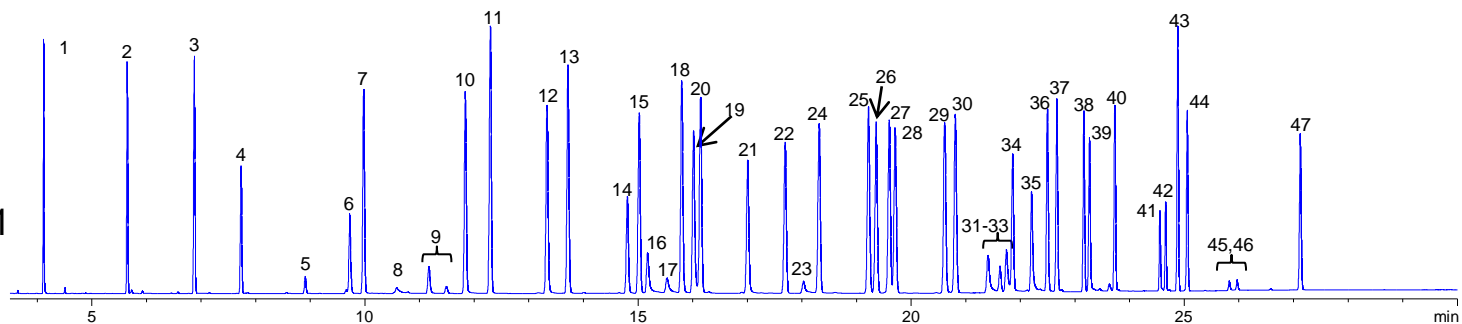
Organochlorine Pesticides

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

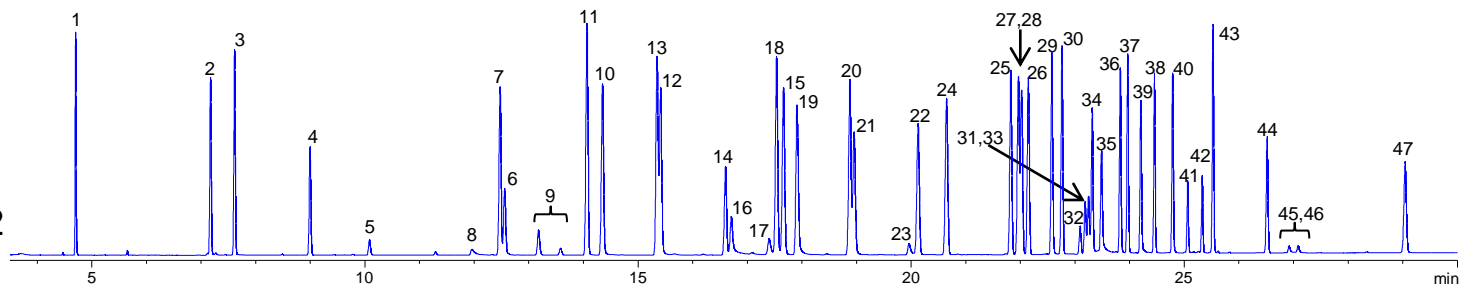
Instrument: Agilent 7890 GC with dual µECD
Sampler: Agilent 7693
Sample: 50 ng/mL 8081B analytes
Inj. Vol.: 2 µL splitless
Liner: Ultra Inert liner, single taper splitless (cat.#5190-2292)
Inj. Temp.: 250°C
Oven Temp: 80°C (hold 0.5 min) to 150°C at 20°C/min, 5°C/min to 235°C, 15°C/min to 300°C, hold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

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

Agilent DB-CLP1



Agilent DB-CLP2



EPA Method 8082A

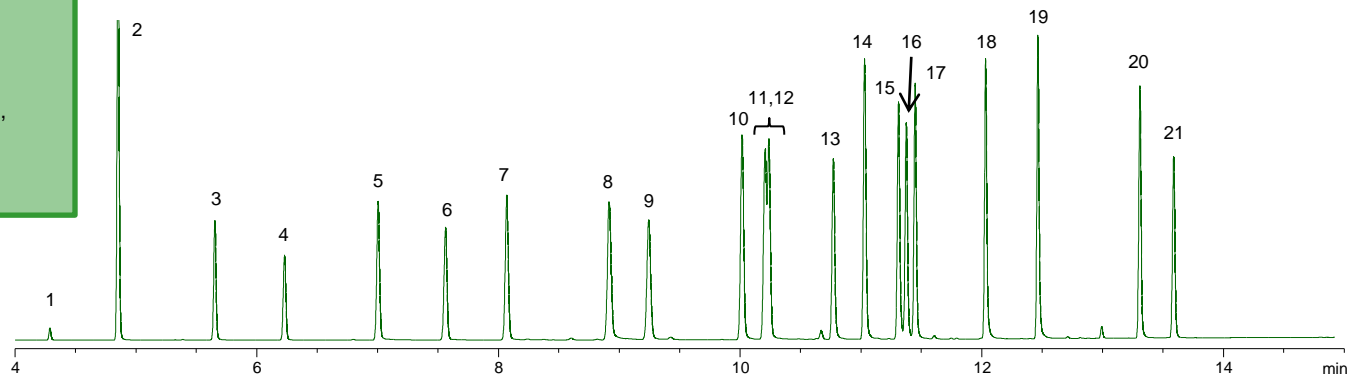
PCB Congeners

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

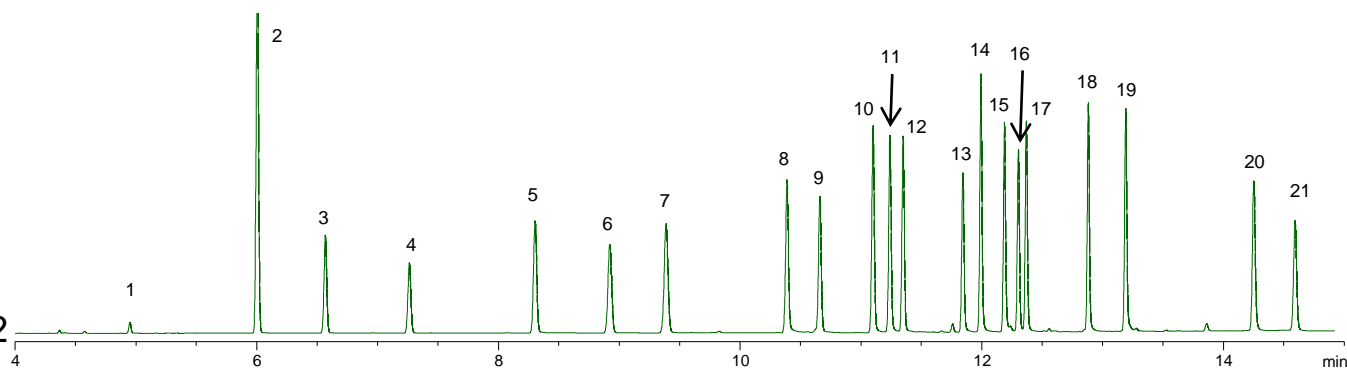
Instrument: Agilent 7890 GC with μ ECD
Sampler: Agilent 7693
Sample: 100 ng/mL PCB congeners
100 ng/mL Pesticide Surrogate Mix
Inj. Vol.: 2 µL splitless
Liner: Ultra Inert liner, single taper splitless
(cat.#5190-2292)
Inj. Temp.: 250°C
Oven Temp: 125°C (hold 0.25 min),
20°C/min to 210°C, hold 0.5 min,
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: μ ECD @ 340 °C

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

Agilent DB-CLP1



Agilent DB-CLP2

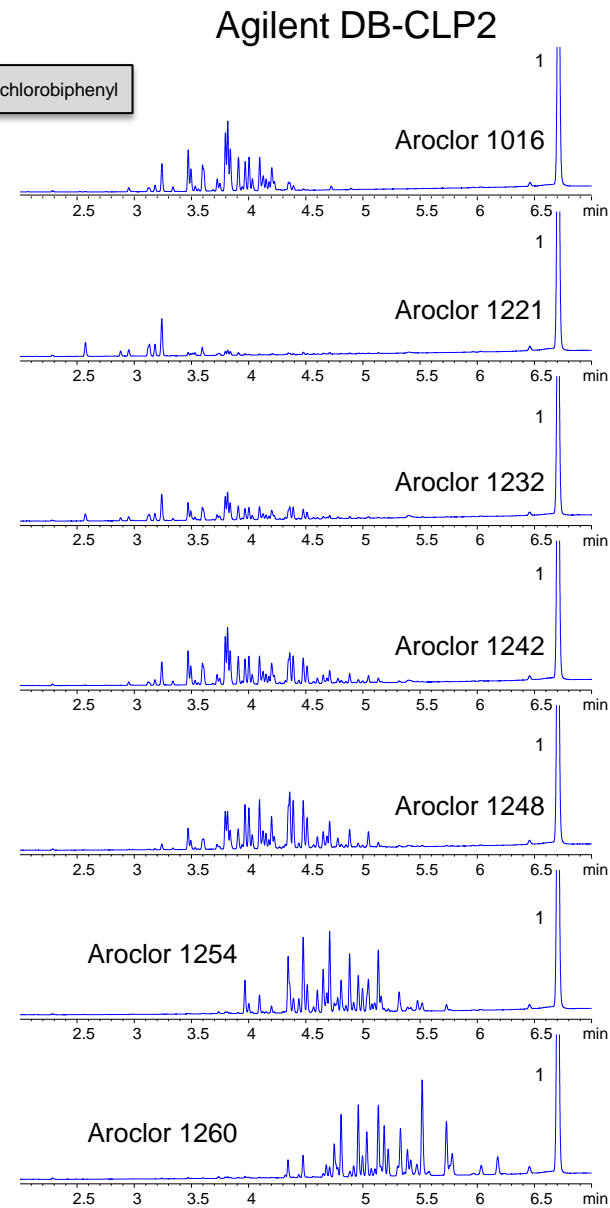
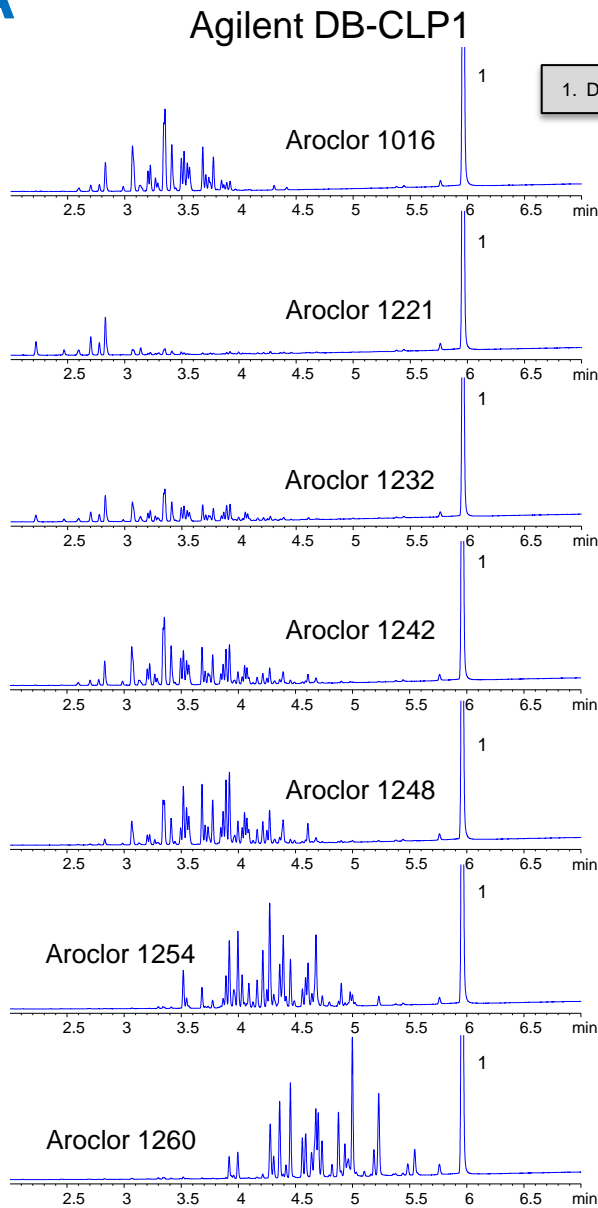


EPA Method 8082A

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 µECD
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



DB-8270D UI

EPA Semivolatiles method

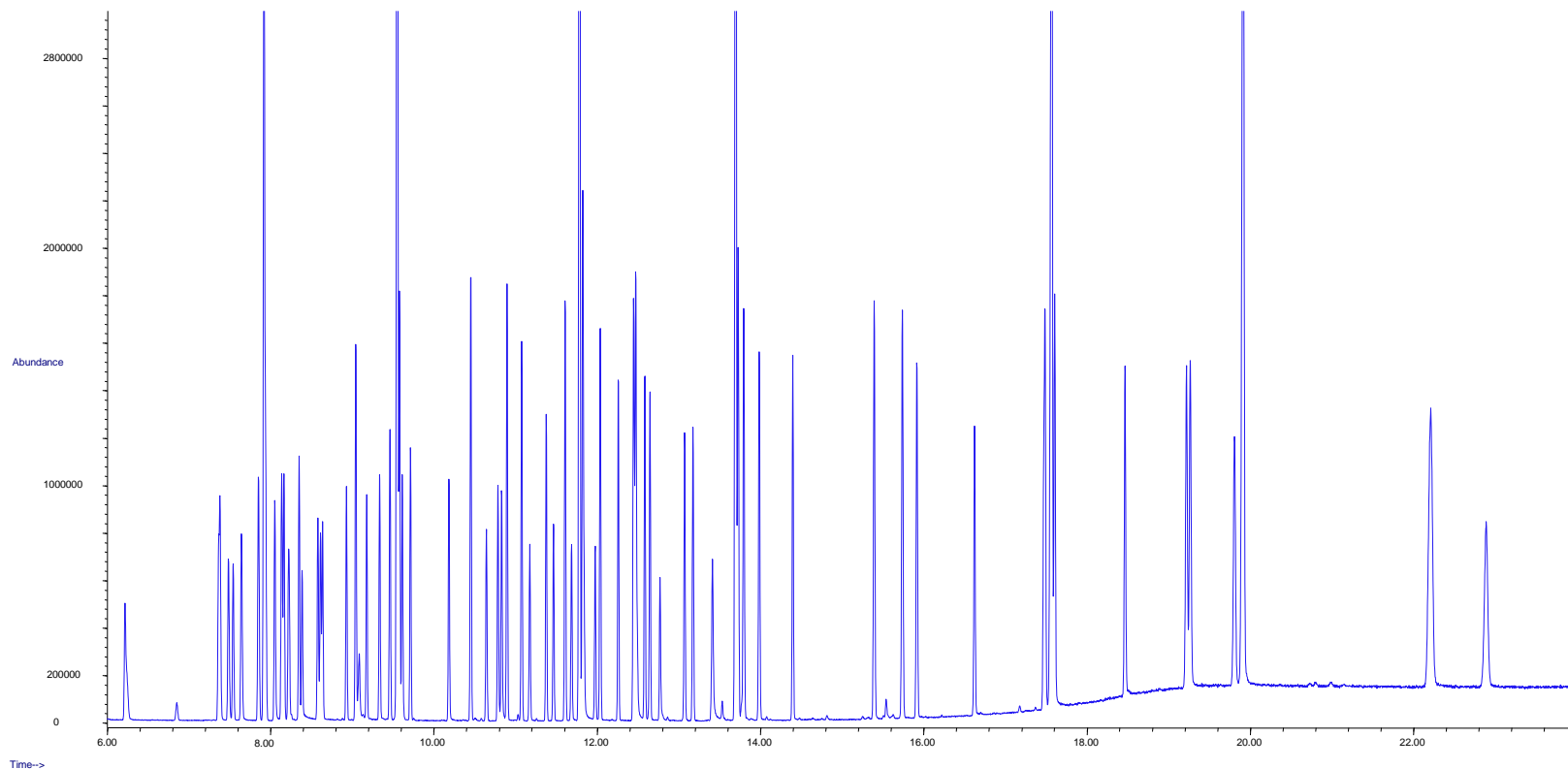
Dirty Samples

Issues with Endrin and DDT breakdown *

Response of 2,4-Dinitrophenol

Resolution

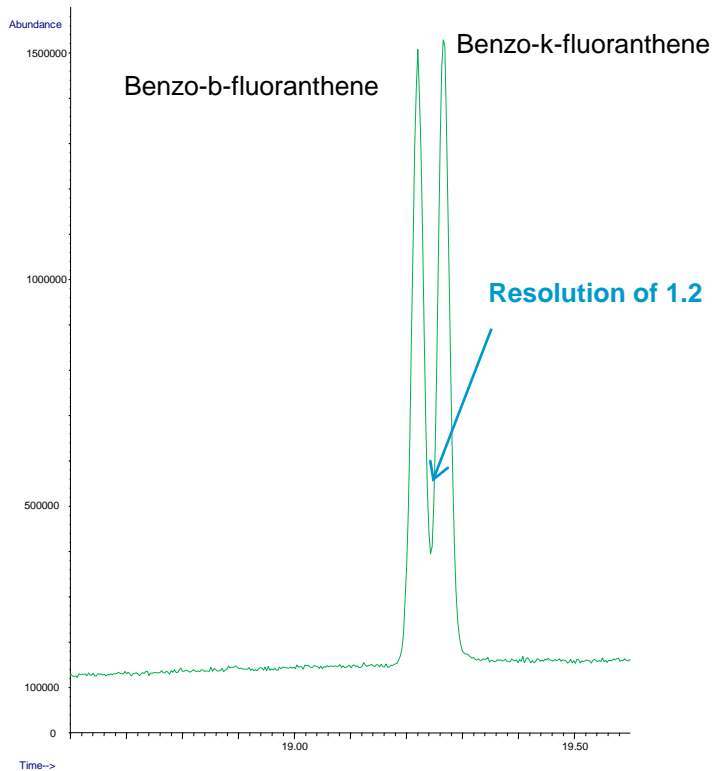
78 Semi-Volatile Components on a DB-UI 8270D 30m x 0.25 x 0.25



25 minute Semi-Volatile Analysis

Application note 5991-0250EN

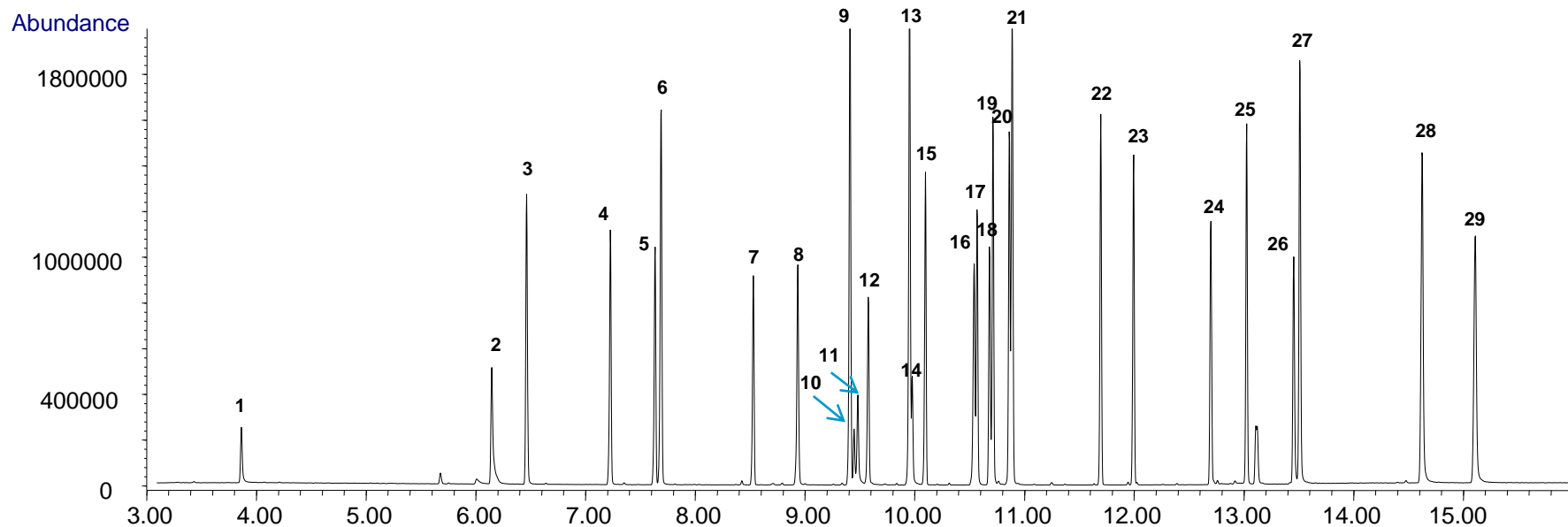
Resolution of benzo-b & k fluoranthene isomers



Positional isomers

Column: Agilent DB-UI 8270D, 30 m x 0.25 mm, 0.25 μ m (p/n 122-9732)
Liner: Dual taper direct connect liner (p/n G1544-80700)
Inlet: MMI in non-pulsed splitless mode 1 μ L at 275 $^{\circ}$ 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 $^{\circ}$ C (1.0 min), 15 $^{\circ}$ C/min to 100 $^{\circ}$ C, 20 $^{\circ}$ C/min to 240 $^{\circ}$ C (0.5 min),
15 $^{\circ}$ C/min to 325 $^{\circ}$ C (6.7 min) Gas saver Off
GC/MSD: Agilent 7890/5975C, 325 $^{\circ}$ C transfer line, 280 $^{\circ}$ C source,
150 $^{\circ}$ C quad, 35-500 AMU range
Sampler: Agilent 7693, 10.0 μ L 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		

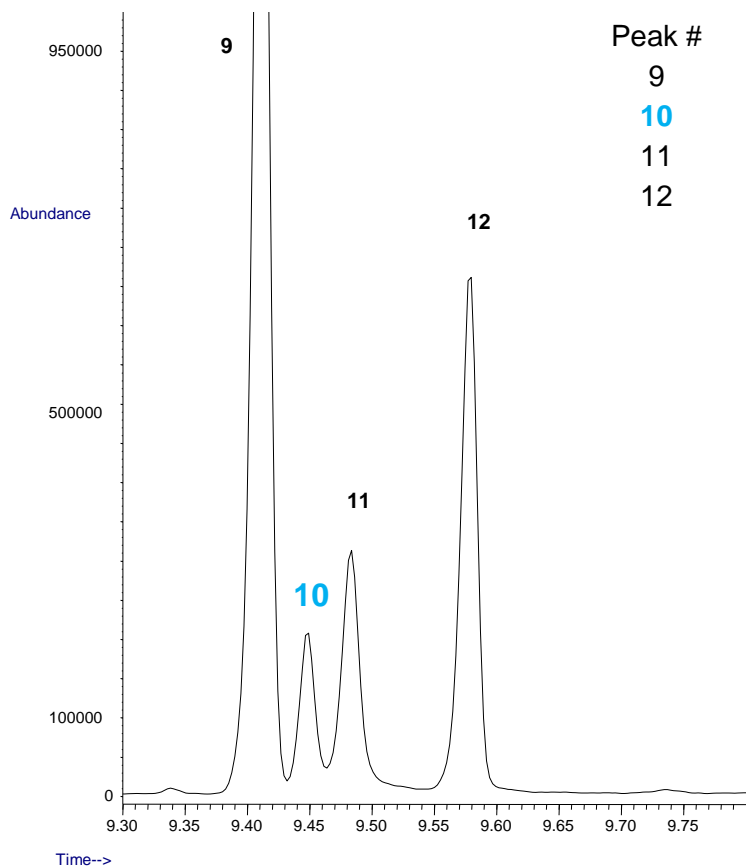
16 minute Semi-Volatile Analysis

Checkout Standard mix Agilent part # 5190-0473



Agilent Technologies

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 μ m

Column 2: 1 m 0.15 mm ID deactivated 2 psi with 5ml/min bleeder

Carrier: 1 ml/min constant flow at 40°C, AUX EPC 2 PSI constant pressure

Backflush: postrun 75 psi AUX EPC 2 PSI inlet

Oven: 40°C (2.5min) to 320°C (25°C/min) 4.8 min hold

Injection: 280°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°C, Source 300°C, Quad 150°C 50 -550 AMU

Additional Enhancements

Ultra Inert Liners



Certificate of Performance

5190 -2293 Ultra Inert Liner

Splitless , Sngl taper, Glass Wool

Liner Body Lot: 0023A

Deactivation Lot: B11002

Tested for: 2ng 4-Aminopyridine
2ng 2,4-Dinitrophenol

Ultimetal Plus



Inlet Weldment

Ultra Inert Gold Seal



Flexible Metal Ferrules



DB-Select 624 UI 467

Residual Solvents Method USP<467>

Procedure A uses “G43” stationary phase

6% cyanopropyl phenyl -94% dimethylpolysiloxane

30 m X 0.53 mm X 3.0 μm

30 m X 0.32 mm X 1.8 μm

USP 467 Application Development

➤ Column Performance Evaluation

- USP Method 467 Residual Solvents

- Standards Criteria

- Class 1

- Carbon Tetrachloride Signal to Noise ≥ 3

- Class 2A

- Resolution of Acetonitrile:Dichloromethane

- Resolution of Methylcyclohexane:1,4-Dioxane

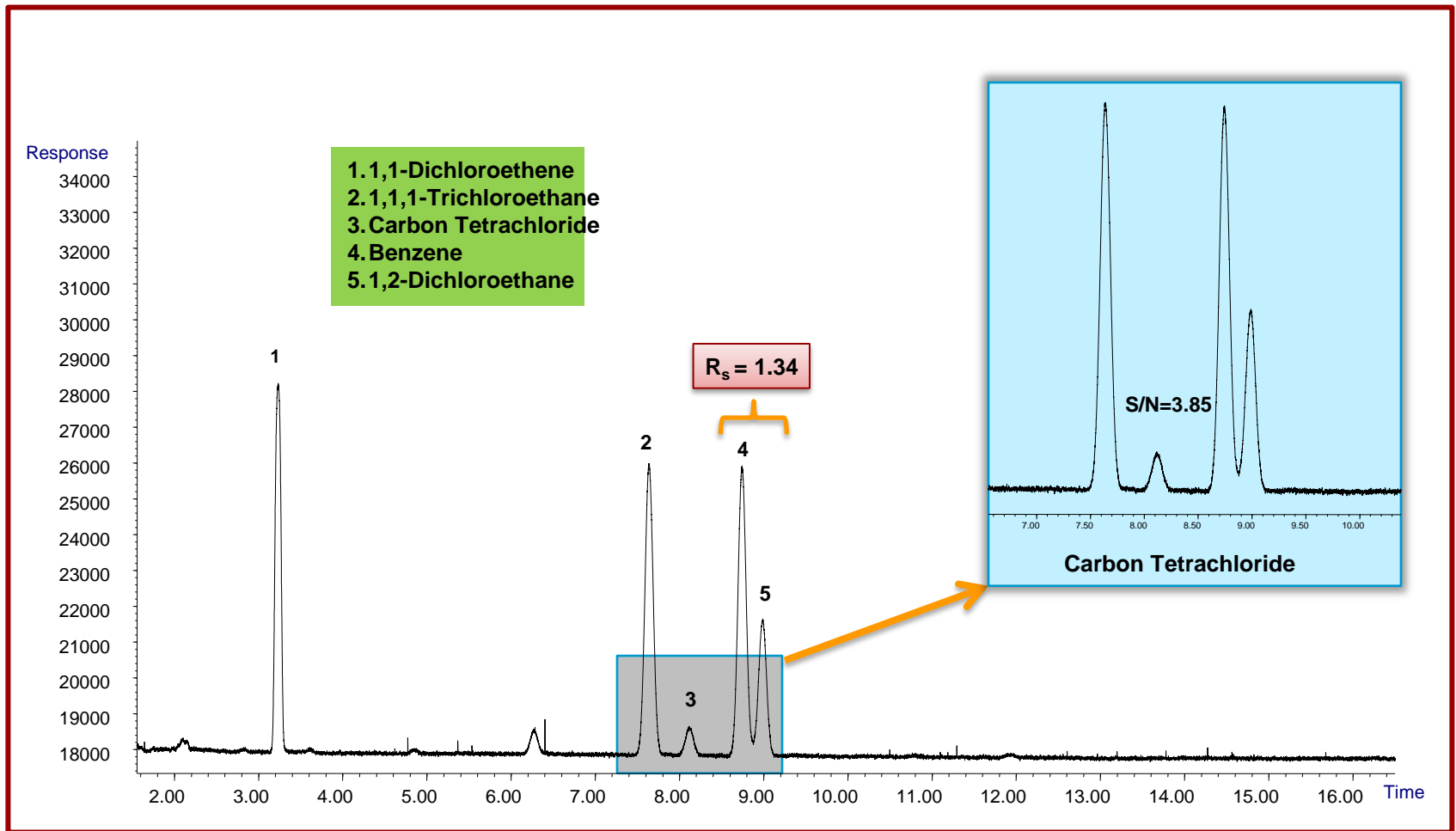
- Tailing of Methylcyclohexane

- Class 2B

- Tailing for Pyridine

USP 467 Class 1

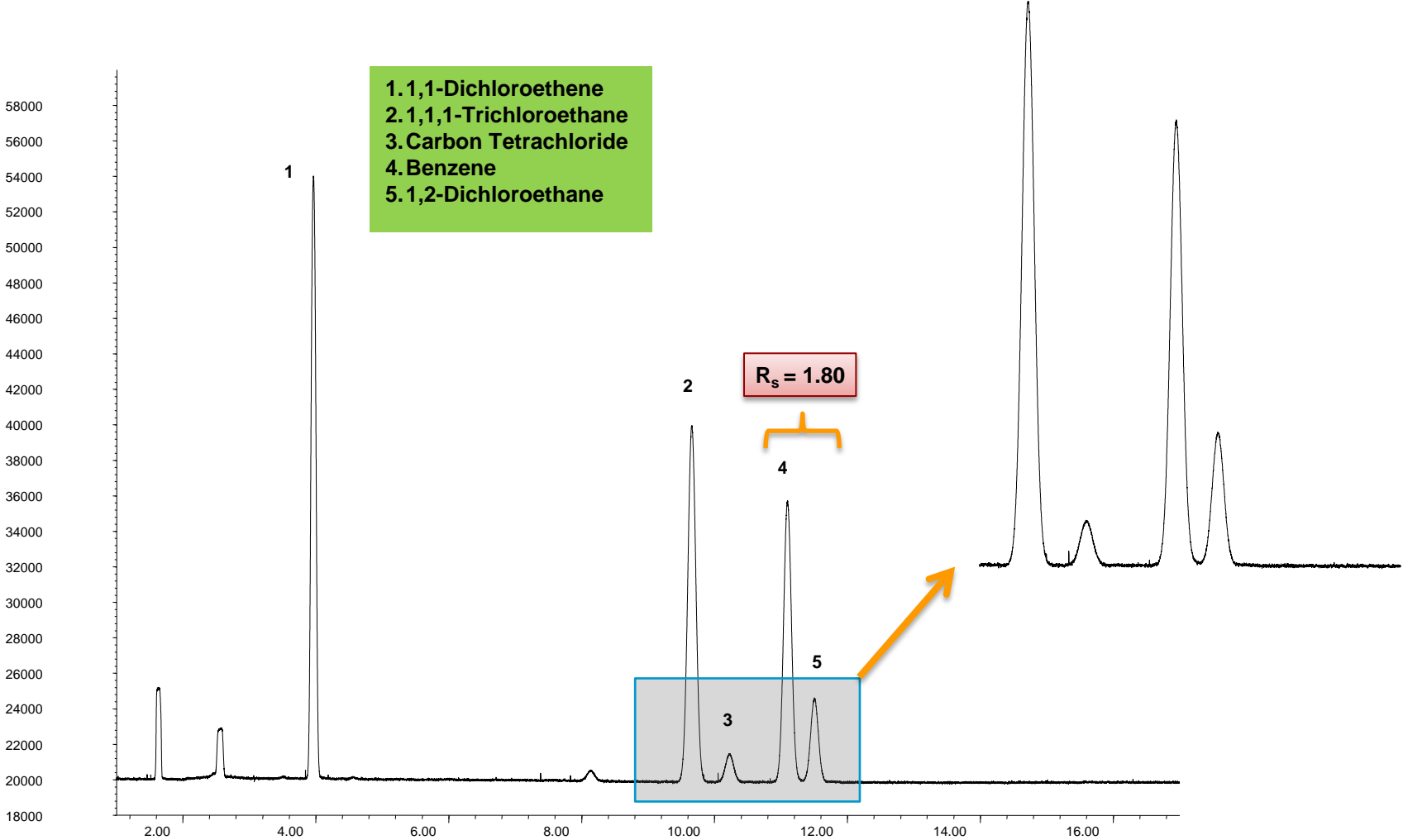
DB-Select 467UI Serial #USC9275175



USP 467 Class 1

DB-Select 467UI Serial #USC284013H

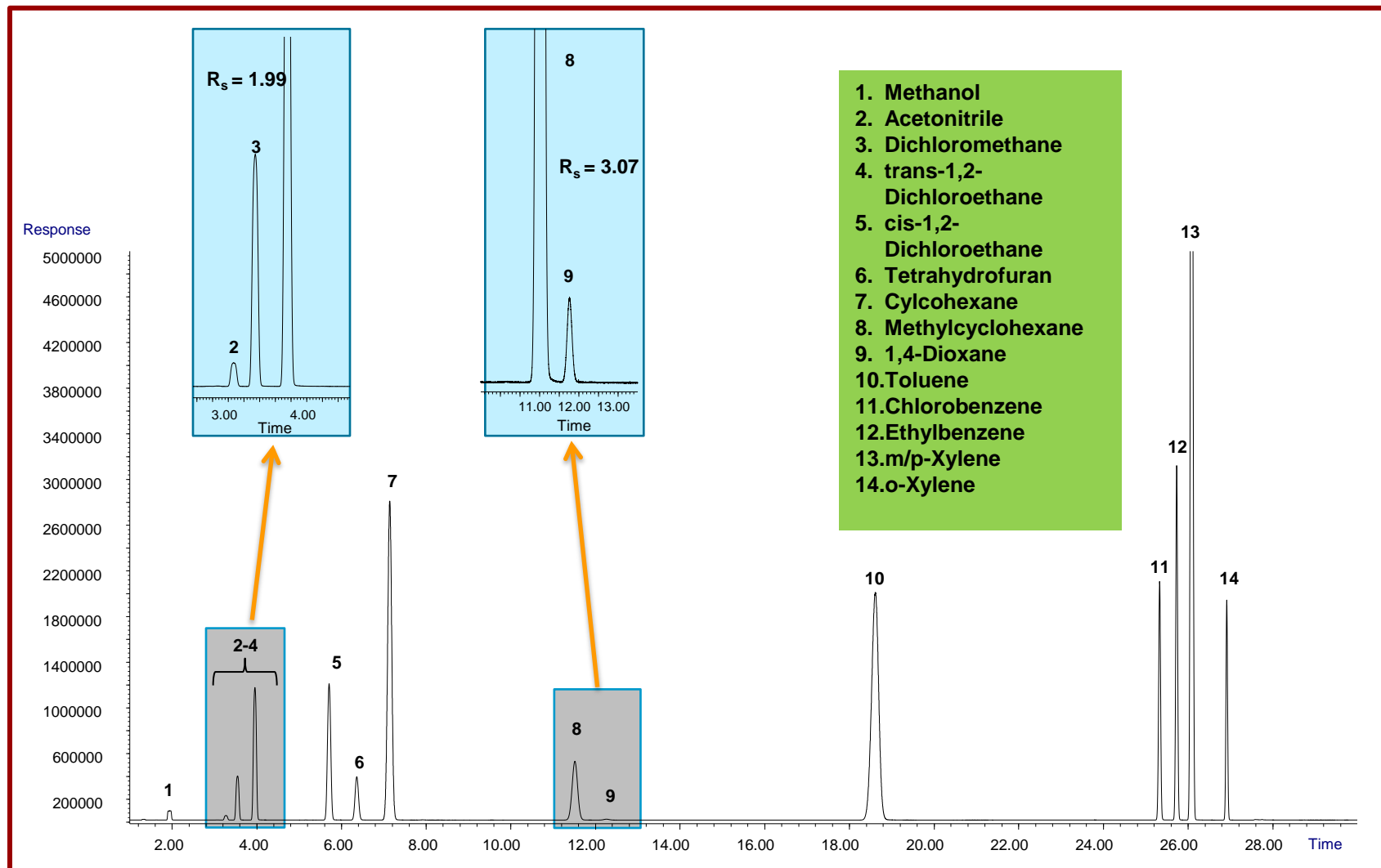
- 1. 1,1-Dichloroethene
- 2. 1,1,1-Trichloroethane
- 3. Carbon Tetrachloride
- 4. Benzene
- 5. 1,2-Dichloroethane



Time

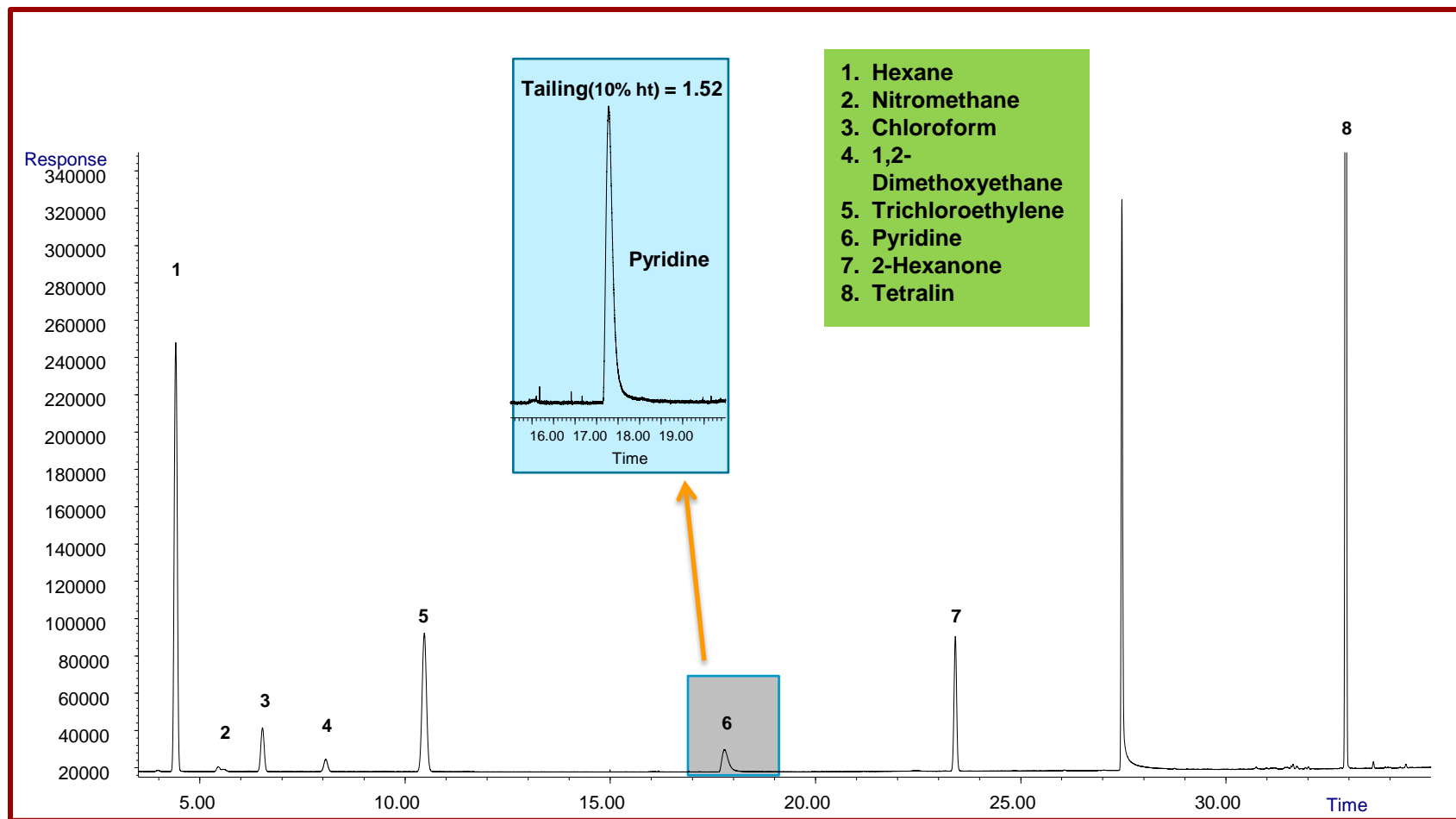
USP 467 Class 2A

DB-624 UI 467 Select Serial #USC9261831

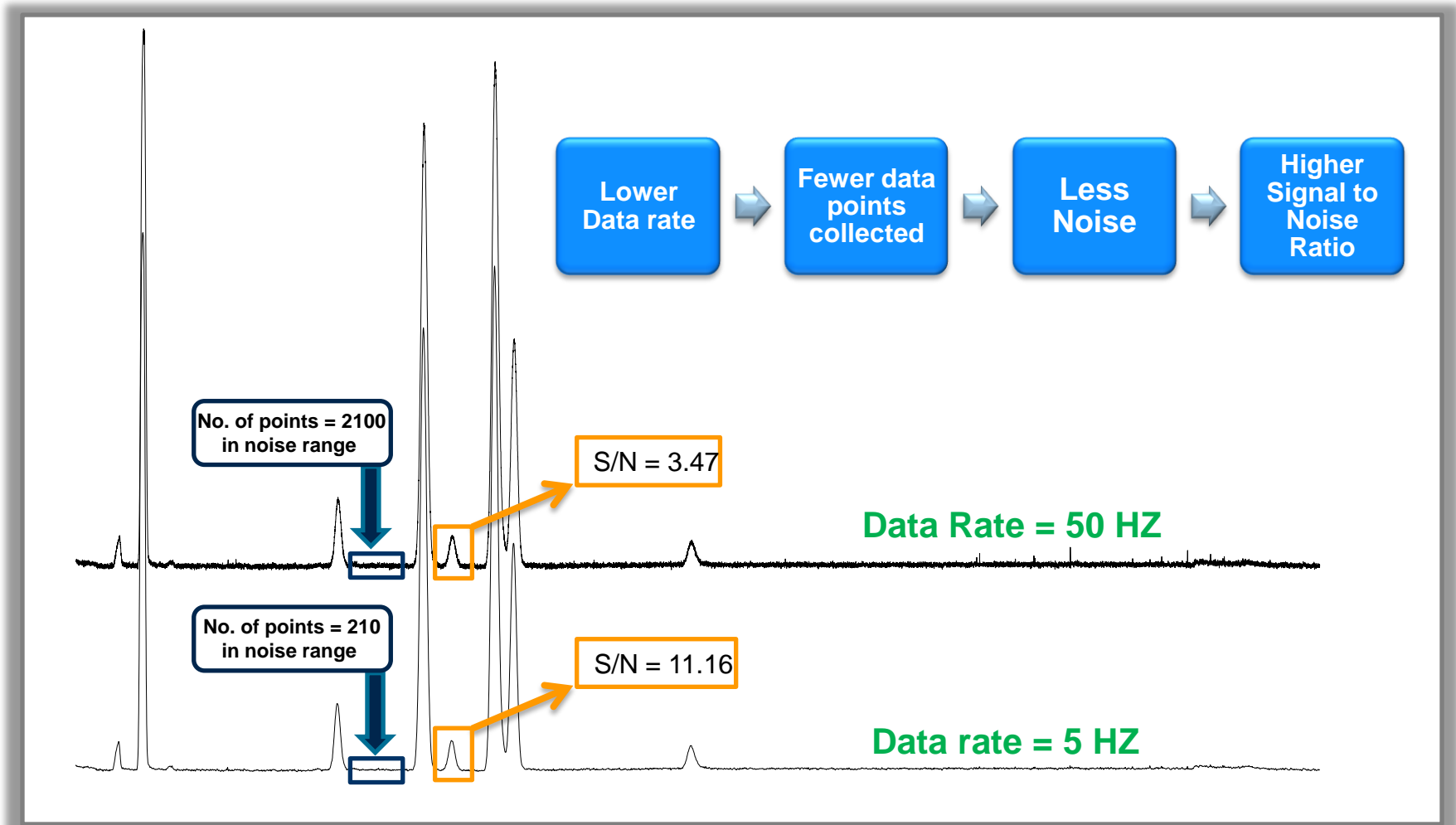


USP 467 Class 2B

DB-624 UI 467 Select Serial #USC9261831



Impact of Data Acquisition Rate on S/N Determination



Conclusions

The Application Specific columns are designed to help address some of the known issues with certain methods.

Can be used for other methods as well

****Samples still kill the columns****

Activity Issues don't reside with the column only!

Depending upon the method, UI liners and gold seals can help reduce or eliminate activity issues

Column Part Numbers

DB-CLP1 123-8232 30 m X 0.32 mm X 0.25 μ m

DB-CLP2 123-8336 30 m X 0.32 mm X 0.50 μ m

DB-Select 624 UI for <467>

122-0334UI 30 m X 0.25 mm X 1.4 μ m

122-0364UI 60 m X 0.25 mm X 1.4 μ m

123-0334UI 30 m X 0.32 mm X 1.8 μ m

123-0364UI 60 m X 0.32 mm X 1.8 μ m

125-0334UI 30 m X 0.53 mm X 3.0 μ m

DB-UI 8270D 121-9723 20 m X 0.18 mm X 0.36 μ m

621-9723 Pack of 6

122-9732 30 m X 0.25 mm X 0.25 μ m

622-9732 Pack of 6

122-9736 30 m X 0.25 mm X 0.50 μ m

Application Notes

Residual Solvent Analysis with a Specifically Designed and Tested Agilent J&W DB-Select 624UI for USP <467> Column

5991-0616EN

Evaluating CLP and EPA Methods for Pesticides in Water Using Agilent J&W DB-CLP1/DB-CLP2 GC Columns

5991-0615EN

Semivolatile Analysis with Specially Designed Agilent J&W DB-UI 8270D Columns

5991-0250EN

Agilent J&W Scientific Technical Support

800-227-9770 (phone: US & Canada)*

** Select option 3, then 3, then 1.*

866-422-5571 (fax)

GC-Column-support@agilent.com



www.chem.agilent.com