

HPLC CHROMATOGRAMS

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HPLC Chromatograms by Column Phase (Alphabetical Order)

Allure® AK		
carbonyls	181, 710	
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Allure® C18		
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Allure® Organic Acids		
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Pinnacle® II Amino		
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allicin	730	
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morphine sulfate	738	
phenolic antioxidants	727, 730	
Pinnacle® II Cyano		
piperine	728	
Pinnacle® II PAH		
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Pinnacle® II Silica		
hydrocodone bitartrate	738	
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pesticides	721	
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sudan dyes	722	
vitamins	731	
Ultra C18		
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aldehydes, ketones	710	
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corticosteroids	741	
drug residues	724	
herbicides	712	
hydrocodone bitartrate, acetaminophen	743	
nitrofurantol metabolites	724	
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vanillin & ethyl vanillin	728	
vitamins	733	
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food contaminants (carbamates)	719	
Ultra Cyano		
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antiarrhythmics	739	
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glyburide	741	
nucleosides, nucleotides, & nucleic acid bases	744	
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Ultra PFP		
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Ultra Phenyl		
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Ultra II® Aqueous C18		
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vitamins	735	
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GC & HPLC Chromatograms Compound Index

starting on page 752

Chromatogram Search Tool

Search by compound name, synonym,
CAS # or keyword

www.restek.com/chromatograms



Carbonyls by CARB Method 1004 on Allure® AK

Sample:

Inj.: 10 µL
 Conc.: 3 µg/mL each analyte, as
 aldehyde/ketone
 Sample diluent: acetonitrile

Column:

Allure® AK
 Cat.#: 9159525-700
 Dimensions: 200mm x 4.6mm
 Particle size: 5 µm
 Pore size: 60 Å

Conditions:

Mobile phase: A) water : B) acetonitrile

Time (min.)	%B
0	60
8	70
10	100

Flow: 1.5 mL/min.

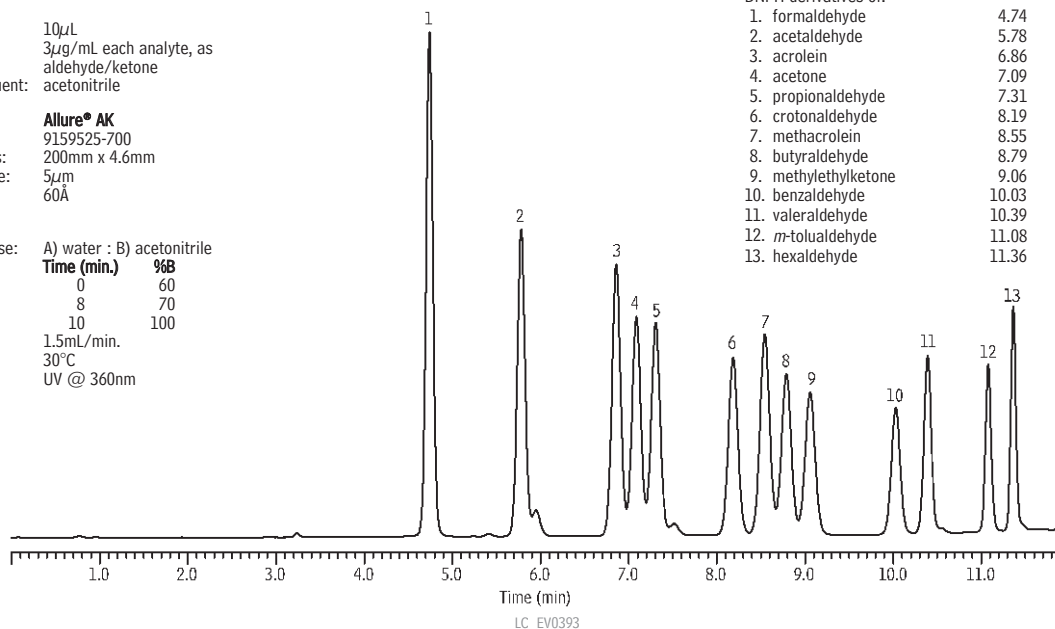
Temp.: 30°C

Det.: UV @ 360nm

Peak

DNPH derivatives of:

Peak	Ret. Time (min.)
1. formaldehyde	4.74
2. acetaldehyde	5.78
3. acrolein	6.86
4. acetone	7.09
5. propionaldehyde	7.31
6. crotonaldehyde	8.19
7. methacrolein	8.55
8. butyraldehyde	8.79
9. methylethylketone	9.06
10. benzaldehyde	10.03
11. valeraldehyde	10.39
12. <i>m</i> -tolualdehyde	11.08
13. hexaldehyde	11.36



Aldehydes and Ketones (DNPH derivatives) on Ultra C18 (40°C)

Peak List:

DNPH derivatives of:

1. formaldehyde
2. acetaldehyde
3. acetone
4. acrolein
5. propionaldehyde
6. crotonaldehyde
7. MEK
8. methacrolein
9. butyraldehyde
10. benzaldehyde
11. valeraldehyde
12. *m*-tolualdehyde
13. hexanaldehyde

Sample:

Inj.: 10 µL
 Conc.: 3.0 µg/mL each derivative

Column:

Ultra C18
 Cat.#: 9174565
 Dimensions: 150mm x 4.6mm
 Particle size: 5 µm
 Pore size: 100 Å

Conditions:

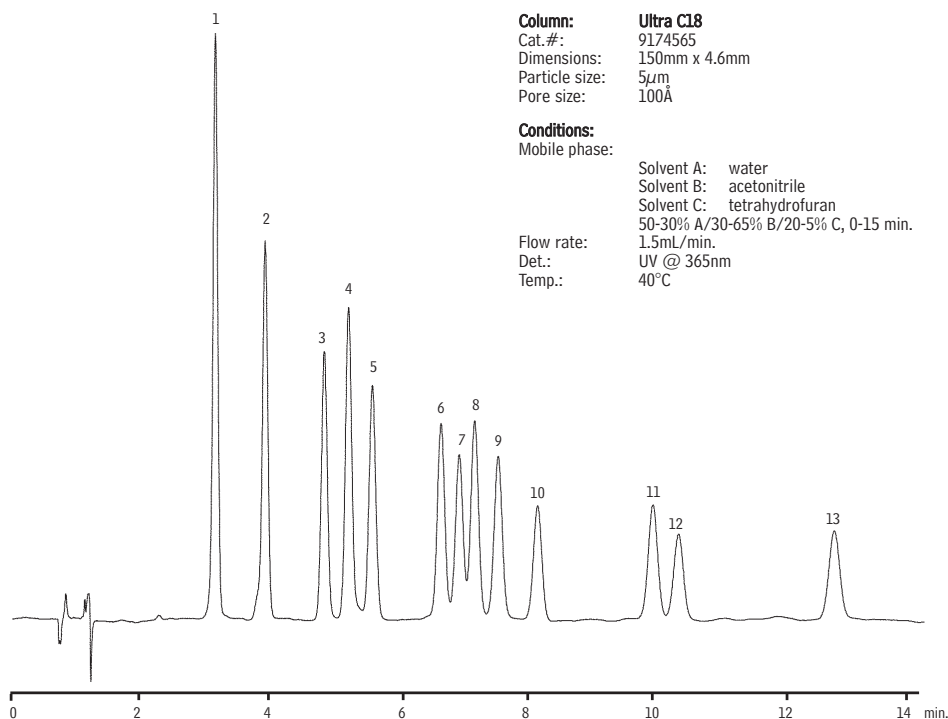
Mobile phase:

Solvent A: water
 Solvent B: acetonitrile
 Solvent C: tetrahydrofuran
 50-30% A/30-65% B/20-5% C, 0-15 min.

Flow rate: 1.5 mL/min.

Det.: UV @ 365nm

Temp.: 40°C



Explosives EPA Method 8330B Ultra II® Aromax

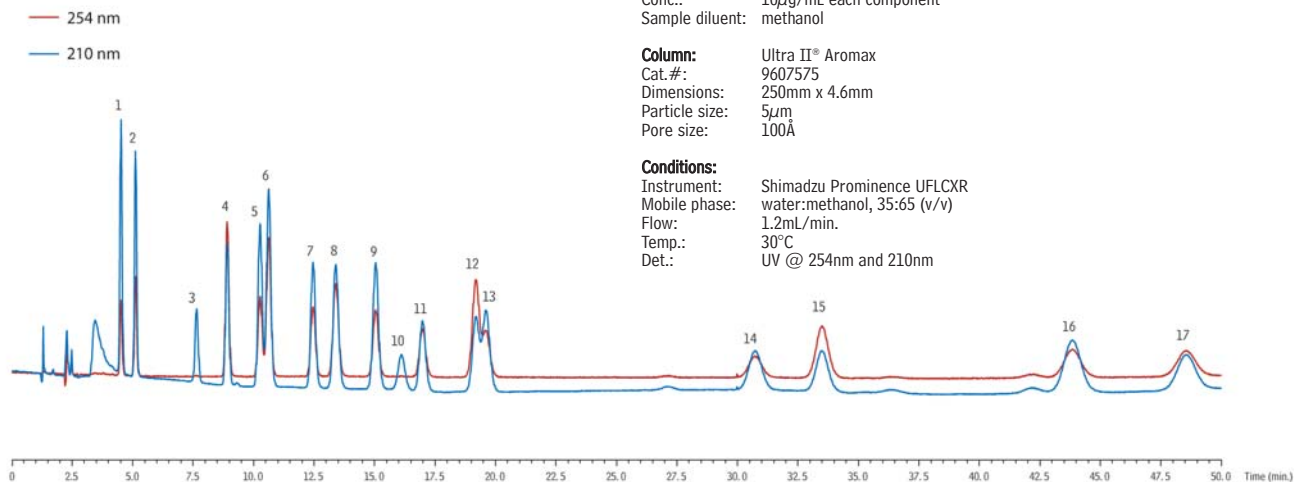
NEW!

- | | |
|-------------------------------|---------------------------|
| 1. HMX | 10. PETN |
| 2. RDX | 11. 4-nitrotoluene |
| 3. nitroglycerin | 12. 1,3-dinitrobenzene |
| 4. nitrobenzene | 13. 2,6-dinitrotoluene |
| 5. 4-amino-2,6-dinitrotoluene | 14. tetryl |
| 6. 3,5-dinitroaniline | 15. 2,4-dinitrotoluene |
| 7. 2-nitrotoluene | 16. 1,3,5-trinitrobenzene |
| 8. 2-amino-4,6-dinitrotoluene | 17. 2,4,6-trinitrotoluene |
| 9. 3-nitrotoluene | |

Sample: Nitroaromatics and Nitramine Explosives by HPLC,
EPA 8330B (cat.# 33204)
Inj.: 10µL
Conc.: 10µg/mL each component
Sample diluent: methanol

Column: Ultra II® Aromax
Cat.#: 9607575
Dimensions: 250mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCXR
Mobile phase: water:methanol, 35:65 (v/v)
Flow: 1.2mL/min.
Temp.: 30°C
Det.: UV @ 254nm and 210nm



LC_EV0484

Explosives EPA Method 8330B Ultra C8

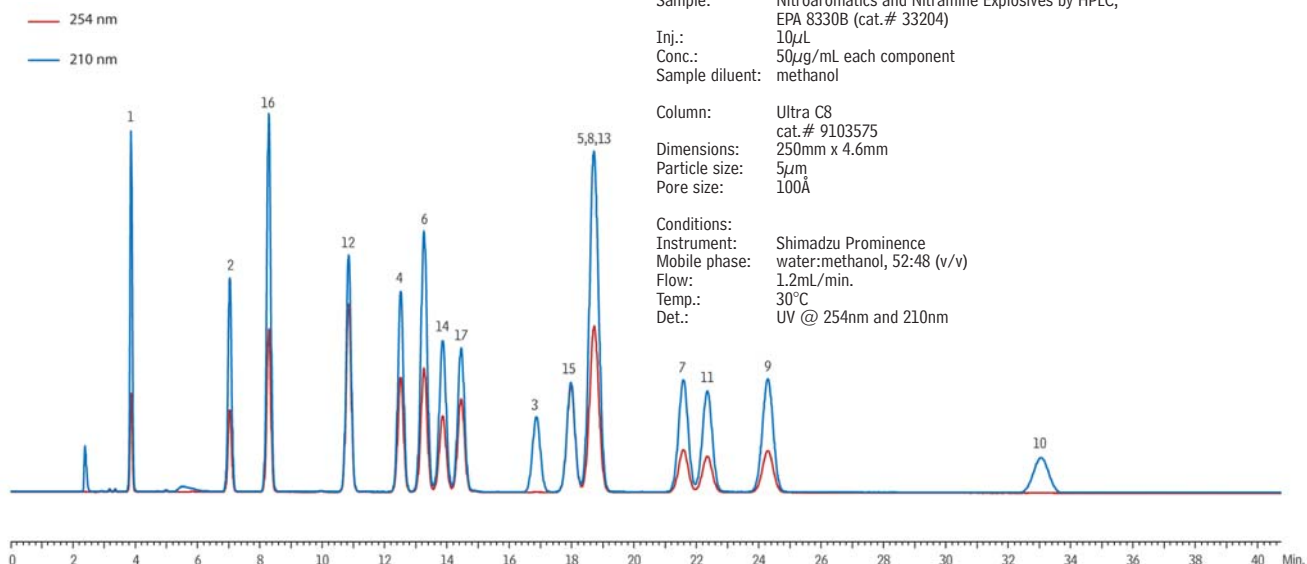
NEW!

- | | |
|-------------------------------|---------------------------|
| 1. HMX | 10. PETN |
| 2. RDX | 11. 4-nitrotoluene |
| 3. nitroglycerin | 12. 1,3-dinitrobenzene |
| 4. nitrobenzene | 13. 2,6-dinitrotoluene |
| 5. 4-amino-2,6-dinitrotoluene | 14. tetryl |
| 6. 3,5-dinitroaniline | 15. 2,4-dinitrotoluene |
| 7. 2-nitrotoluene | 16. 1,3,5-trinitrobenzene |
| 8. 2-amino-4,6-dinitrotoluene | 17. 2,4,6-trinitrotoluene |
| 9. 3-nitrotoluene | |

Sample: Nitroaromatics and Nitramine Explosives by HPLC,
EPA 8330B (cat.# 33204)
Inj.: 10µL
Conc.: 50µg/mL each component
Sample diluent: methanol

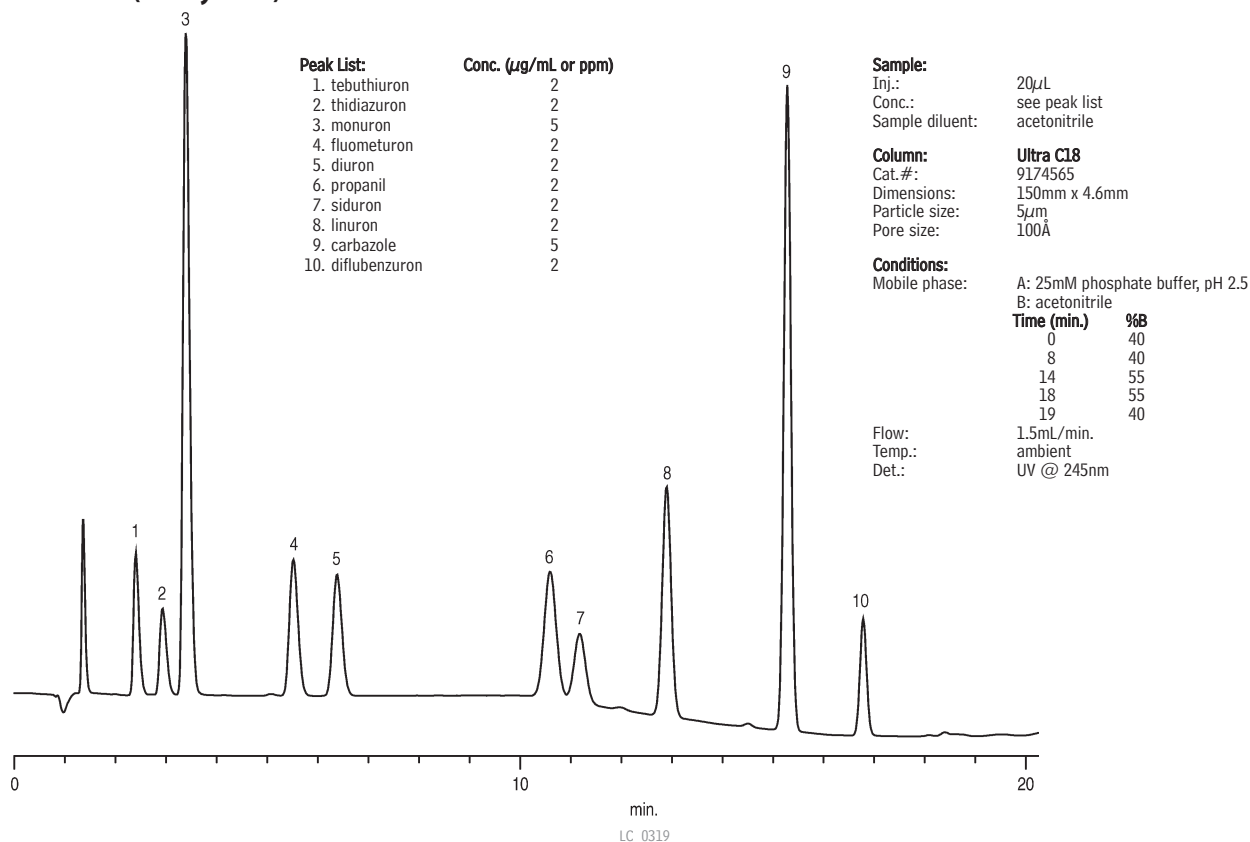
Column: Ultra C8
cat.# 9103575
Dimensions: 250mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence
Mobile phase: water:methanol, 52:48 (v/v)
Flow: 1.2mL/min.
Temp.: 30°C
Det.: UV @ 254nm and 210nm

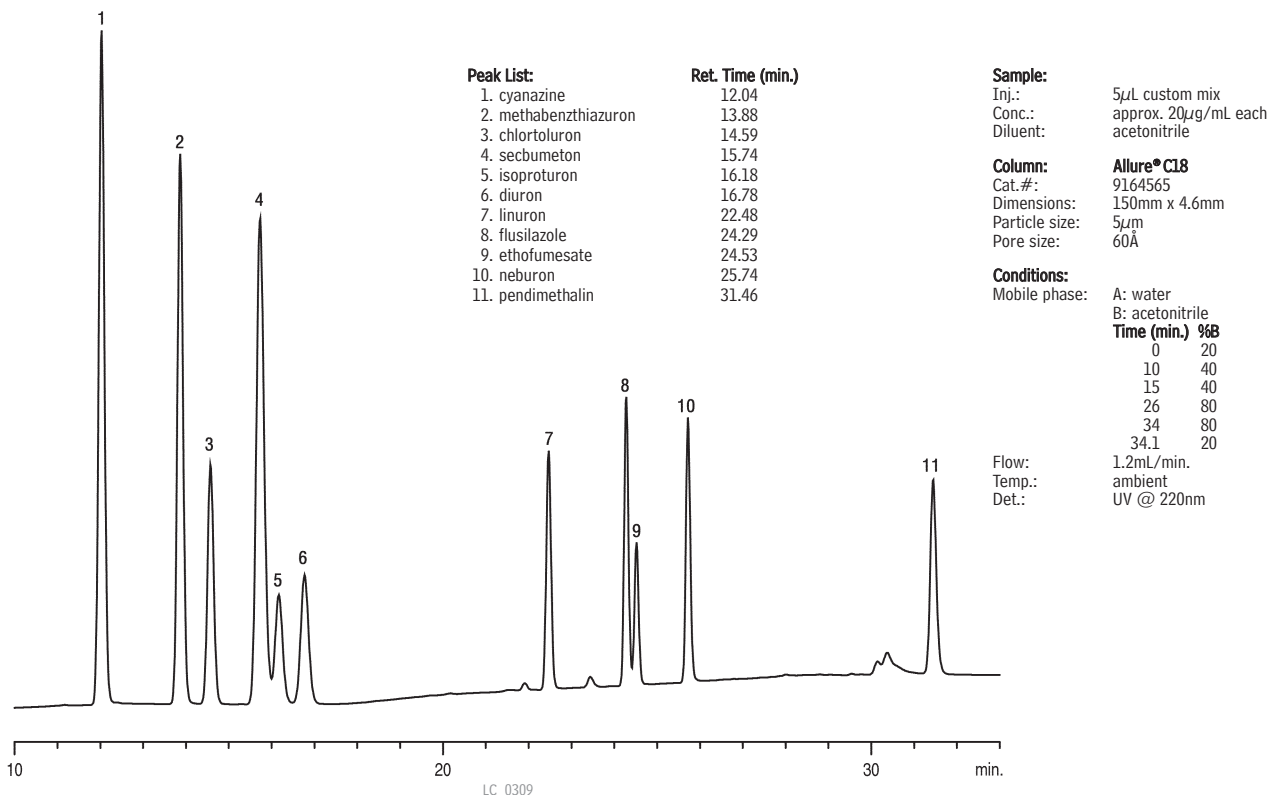


LC_EV0485

Herbicides (Phenylurea) on Ultra C18

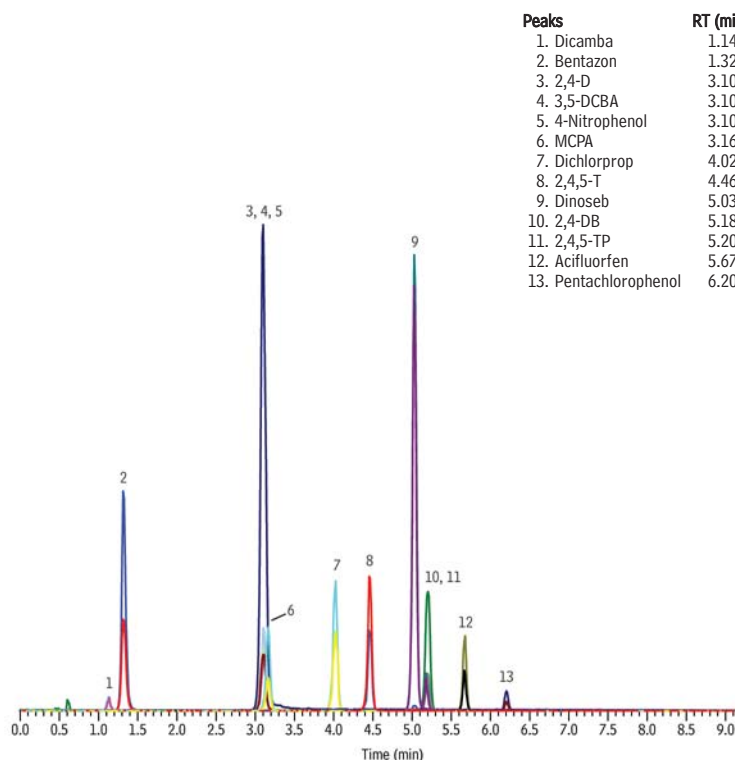


Herbicides on Allure® C18



Phenoxyacid Herbicides on Ultra II® Aqueous C18 (LC/MS/MS)

NEW!



LC_EV0511

Peaks	RT (min.)	MRM 1	MRM 2
1. Dicamba	1.14	219.0 → 175.0	221.0 → 177.0
2. Bentazon	1.32	239.0 → 132.0	239.0 → 175.0
3. 2,4-D	3.10	218.9 → 161.0	220.9 → 163.0
4. 3,5-DCBA	3.10	189.0 → 144.8	189.0 → 59.0
5. 4-Nitrophenol	3.10	138.1 → 108.1	138.1 → 46.0
6. MCPA	3.16	199.0 → 141.0	201.0 → 143.0
7. Dichlorprop	4.02	233.0 → 161.0	235.0 → 163.0
8. 2,4,5-T	4.46	252.9 → 194.9	254.9 → 196.9
9. Dinoseb	5.03	239.0 → 133.9	239.0 → 193.8
10. 2,4-DB	5.18	247.0 → 161.0	249.0 → 163.0
11. 2,4,5-TP	5.20	266.9 → 195.0	266.9 → 159.0
12. Acifluorfen	5.67	359.9 → 316.1	359.9 → 195.0
13. Pentachlorophenol	6.20	264.8 → 35.0	264.8 → 37.0

Column Ultra II® Aqueous C18 (cat.# 9608312)
 Dimensions: 100 mm x 2.1 mm ID
 Particle Size: 3 µm
 Pore Size: 100 Å
 Temp.: 35 °C

Sample phenoxyacid herbicides
 Diluent: acetonitrile
 Conc.: 100 ppb
 Inj. Vol.: 10 µL

Mobile Phase
 A: 10mM ammonium acetate in water
 B: 10mM ammonium acetate in methanol

Time (min.)	%A	%B
0	80	20
8	10	90
12	0	100
14.8	0	100
15	80	20

Flow: 0.5 mL/min.
Detector Applied Biosystems/MDS Sciex LC/MS/MS
 Model #: 4000 QTRAP™ LC/MS/MS System
 Ion Source: Electrospray
 Ion Mode: ESI-
 Ion Spray Voltage: -4.2 kV
 ESI Voltage: -4.2 V
 Gas 1: 50 psi (344.7 kPa)
 Gas 2: 60 psi (413.7 kPa)
 Source Temp.: 600 °C
 Mode: MRM
Instrument Applied Biosystems/MDS Sciex LC/MS/MS System
Acknowledgement Work performed at Applied Biosystems

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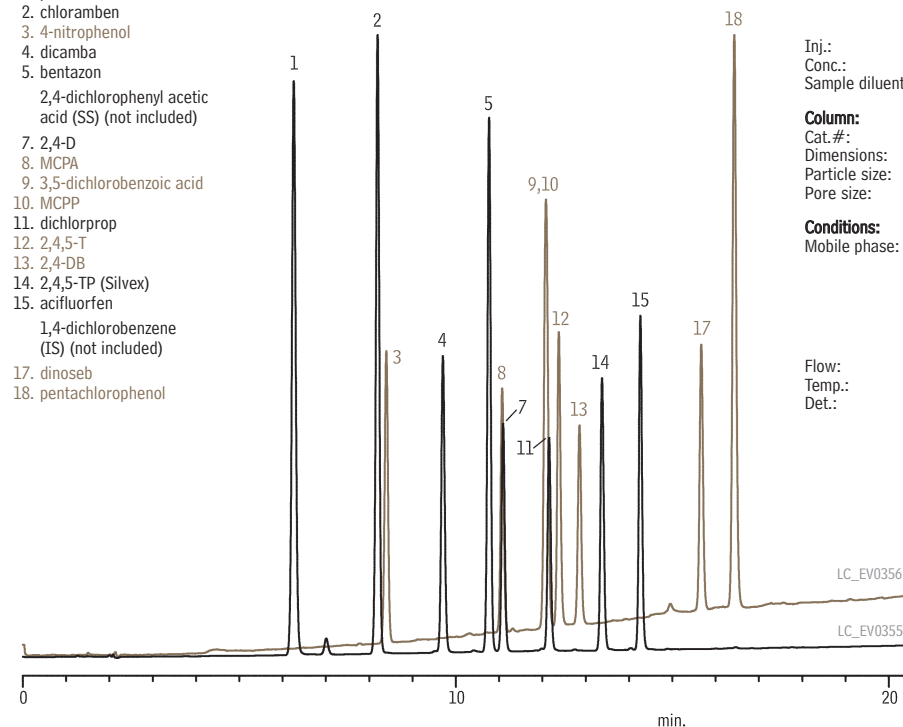
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Phenoxyacid Herbicides on Ultra Aqueous C18

Mix A and Mix B

1. picloram
2. chloramben
3. 4-nitrophenol
4. dicamba
5. bentazon
- 2,4-dichlorophenyl acetic acid (SS) (not included)
7. 2,4-D
8. MCPA
9. 3,5-dichlorobenzoic acid
10. MCPP
11. dichlorprop
12. 2,4,5-T
13. 2,4-DB
14. 2,4,5-TP (Silvex)
15. acifluorfen
- 1,4-dichlorobenzene (IS) (not included)
17. dinoseb
18. pentachlorophenol



Sample:

Sample: Chlorinated Acids by HPLC, Mix A (cat.# 32431), or Chlorinated Acids by HPLC, Mix B (cat.# 32430) 1,000µg/mL each component in acetonitrile

Inj.:

10µL

Conc.:

10ppm each analyte

Sample diluent:

acetonitrile

Column:

Ultra Aqueous C18

Cat.#: 9178565

Dimensions: 150mm x 4.6mm

Particle size: 5µm

Pore size: 100Å

Conditions:

Mobile phase:

A) 0.05% H₃PO₄ B) acetonitrile

Time (min.)

%B

0 20.0

28 80.0

33 90.0

34 20.0

Flow:

1.0mL/min.

Temp.:

ambient

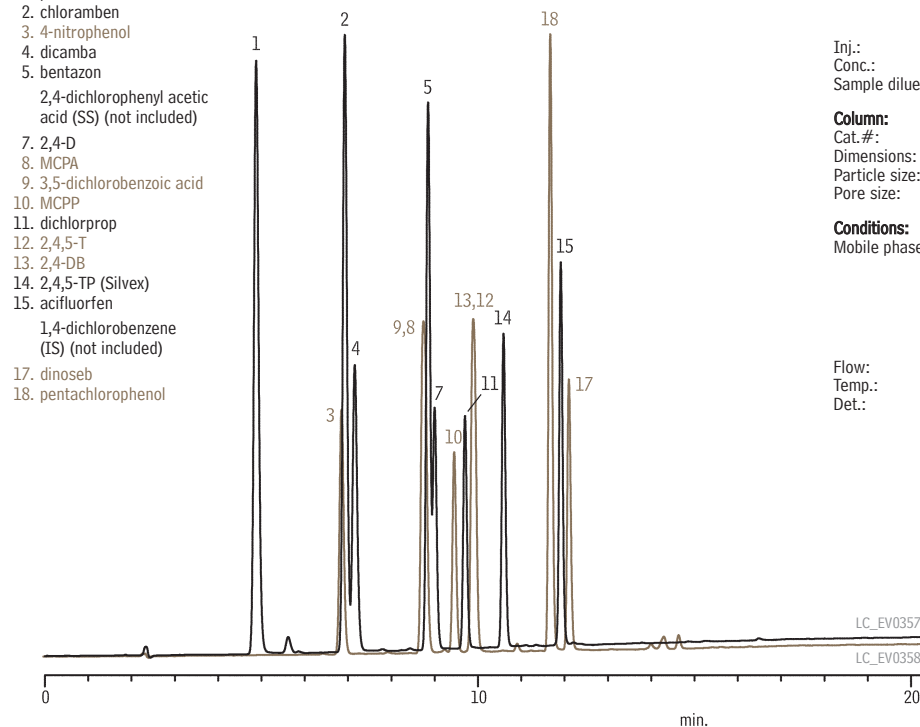
Det.:

UV @ 225nm

Phenoxyacid Herbicides on Allure® Basix

Mix A and Mix B

1. picloram
2. chloramben
3. 4-nitrophenol
4. dicamba
5. bentazon
- 2,4-dichlorophenyl acetic acid (SS) (not included)
7. 2,4-D
8. MCPA
9. 3,5-dichlorobenzoic acid
10. MCPP
11. dichlorprop
12. 2,4,5-T
13. 2,4-DB
14. 2,4,5-TP (Silvex)
15. acifluorfen
- 1,4-dichlorobenzene (IS) (not included)
17. dinoseb
18. pentachlorophenol



Sample:

Sample: Chlorinated Acids by HPLC, Mix A (cat.# 32431), or Chlorinated Acids by HPLC, Mix B (cat.# 32430) 1,000µg/mL each component in acetonitrile

Inj.:

10µL

Conc.:

10ppm each analyte

Sample diluent:

acetonitrile

Column:

Allure® Basix

Cat.#: 9161565

Dimensions: 150mm x 4.6mm

Particle size: 5µm

Pore size: 60Å

Conditions:

Mobile phase:

A) 0.05% H₃PO₄ B) acetonitrile

Time (min.)

%B

0 20.0

28 80.0

33 90.0

34 20.0

Flow:

1.0mL/min.

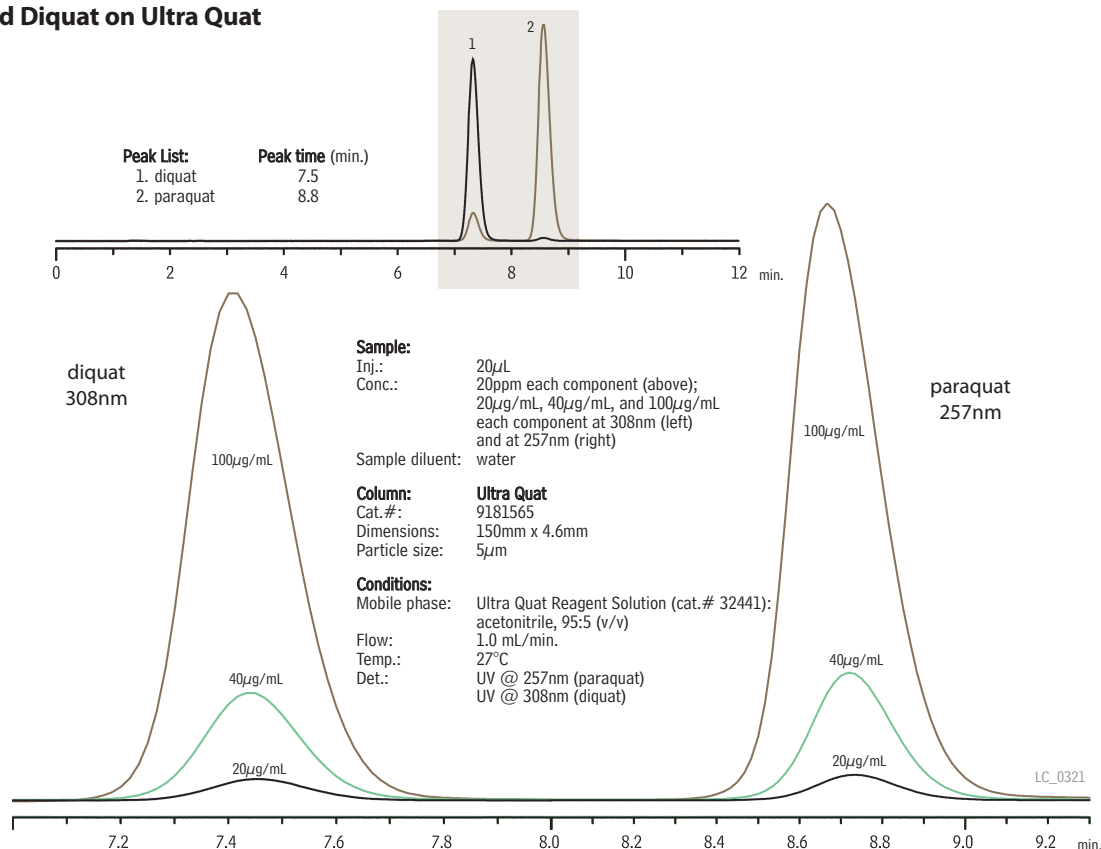
Temp.:

ambient

Det.:

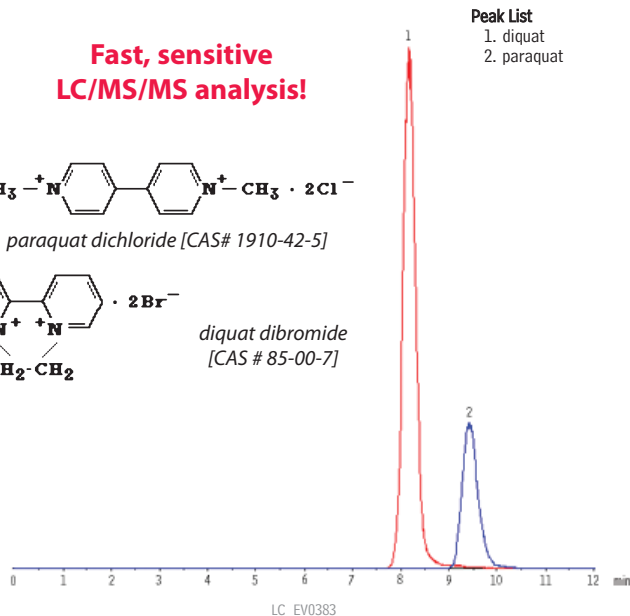
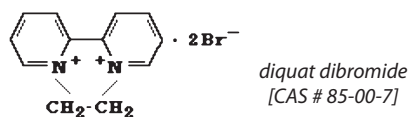
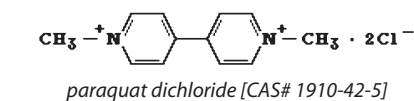
UV @ 225nm

Paraquat and Diquat on Ultra Quat



Paraquat and Diquat on Ultra Quat

**Fast, sensitive
LC/MS/MS analysis!**



*Data courtesy of Houssain El Aribi, Ph.D., LC/MS Product and Application Specialist, MDS SCIEX,
71 Four Valley Drive, Concord, Ontario, Canada, L4K 4V8

Sample:
Inj.: 10µL
Conc.: 5µg/mL each component
Sample diluent: DI water
Sample temp.: ambient

Column: Ultra Quat
Cat. #: 5181352
Dimensions: 50mm x 2.1mm
Particle size: 3µm
Pore size: 100Å

Conditions:
Mobile phase: 10mM heptafluorobutyric acid:acetonitrile, 95:5 (v/v)
Flow: 0.3mL/min.
Temp.: ambient
Det.: Applied Biosystems/MDS SCIEX API 3200™
MS/MS system
Interface: electrospray
Ion Mode: positive
Temp.: 600°C
Ion Spray voltage: 5,500V
Collision exit potential: 3V
Curtain Gas: 15psi (103kPa)
Gas supply 1: 70psi (483kPa)
Gas supply 2: 60psi (414kPa)
Quantitation: (MRM)
Q1/Q3: unit resolution
Dwell time: 200 ms

Precursor Ion (amu)	Fragment Ion (amu)	DP (V)	Collision Energy (eV)
diquat, 183+	157+	30	30
paraquat, 93 (2+)	171+	20	20

Pesticides on Allure® C18

Peak List:

1. desisopropyl atrazine
2. desethyl atrazine
3. simazine
4. terbutylazine desethyl
5. cyanazine
6. methabenzthiazuron
7. chlortoluron
8. atrazine
9. secbumeton
10. isoproturon
11. diuron
12. terbumeton
13. terbutylazine
14. linuron
15. flusilazole
16. ethofumesate
17. neburon

Sample:

Inj.: 5µL
Conc.: approx. 10ppm each pesticide
Solvent: acetonitrile

Column:

Allure® C18
Cat. #: 9164565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 60Å

Conditions:

Mobile phase A: 20mM K₂HPO₄, pH 7.0

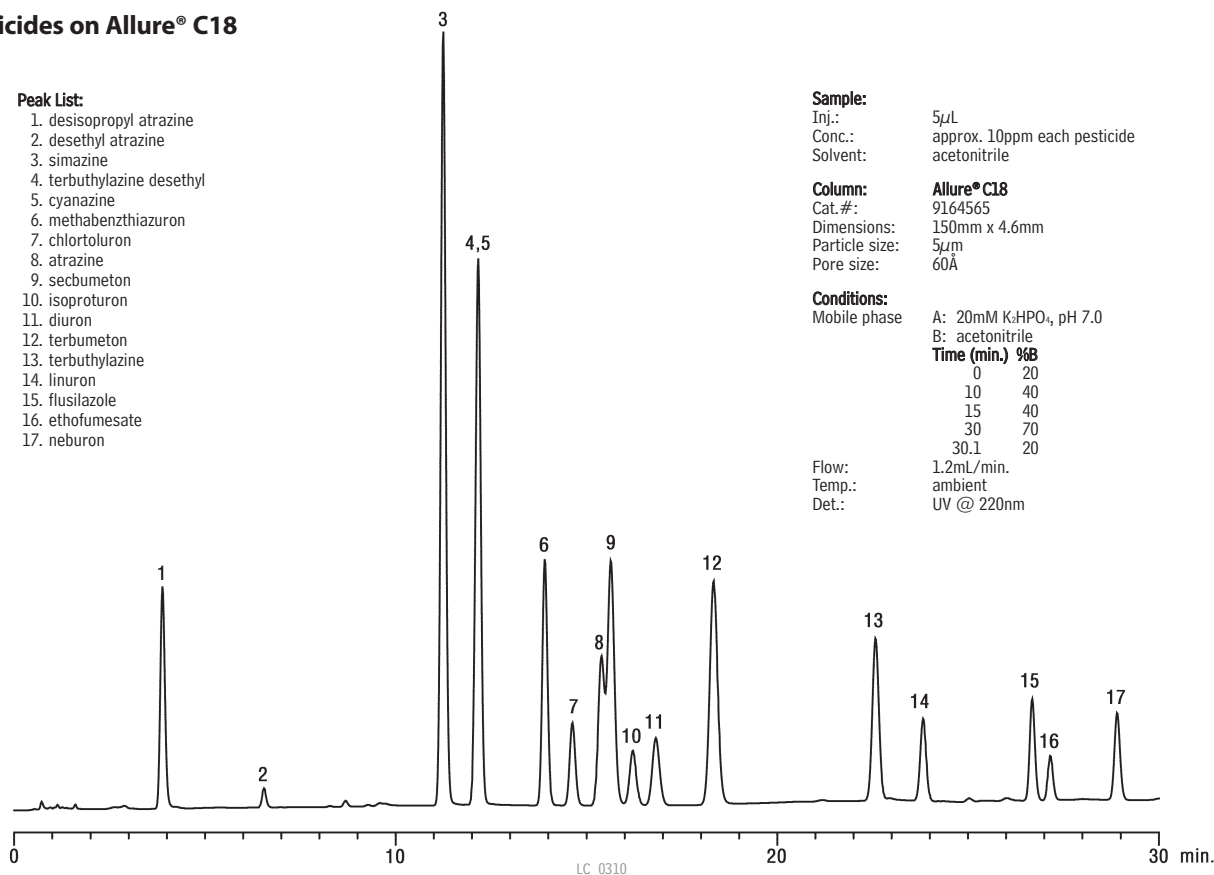
B: acetonitrile

Time (min.)	%B
0	20
10	40
15	40
30	70
30.1	20

Flow: 1.2mL/min.

Temp.: ambient

Det.: UV @ 220nm



Diflubenzuron (Pesticide) on Ultra IBD

Peak List:

1. diflubenzuron
2. N,N'-bis-(chlorobenzyl)urea

Sample:

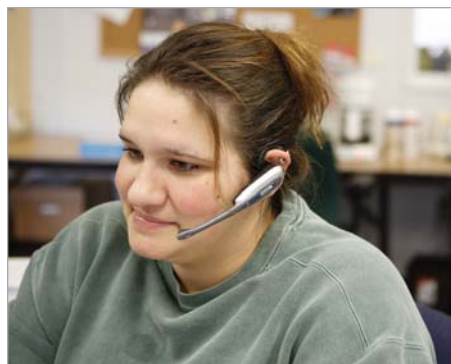
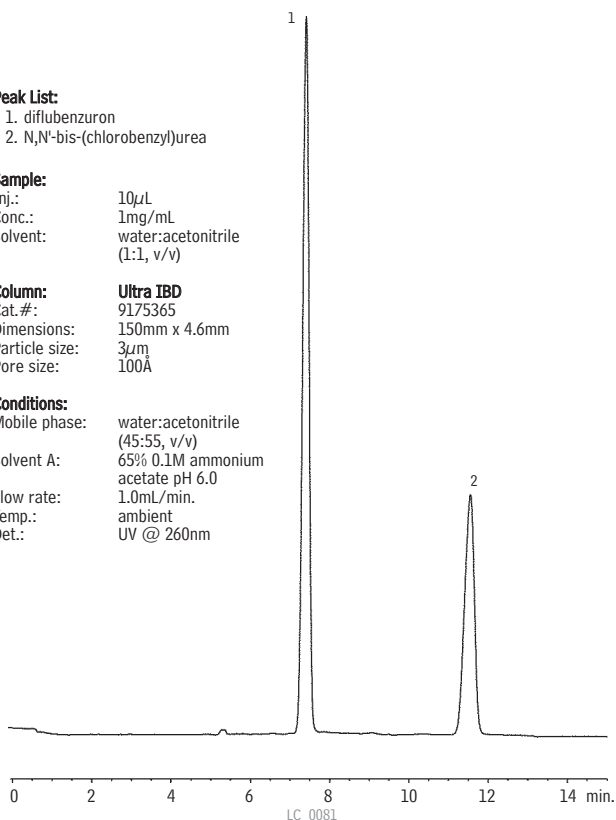
Inj.: 10µL
Conc.: 1mg/mL
Solvent: water:acetonitrile
(1:1, v/v)

Column:

Ultra IBD
Cat. #: 9175365
Dimensions: 150mm x 4.6mm
Particle size: 3µm
Pore size: 100Å

Conditions:

Mobile phase: water:acetonitrile
(45:55, v/v)
Solvent A: 65% 0.1M ammonium
acetate pH 6.0
Flow rate: 1.0mL/min.
Temp.: ambient
Det.: UV @ 260nm



Jamie Hubler, Customer Service

Restek Customer Service

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Online: www.restek.com—24-hours a day

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Refer to our list on pages 4-5 or visit our
website at www.restek.com

Polycyclic Aromatic Hydrocarbons Pinnacle® II PAH

1. naphthalene
2. acenaphthylene
3. acenaphthene
4. fluorene
5. phenanthrene
6. anthracene
7. fluoranthene
8. pyrene
9. benzo(a)anthracene
10. chrysene
11. benzo(b)fluoranthene
12. benzo(k)fluoranthene
13. benzo(a)pyrene
14. benzo(ghi)perylene
15. dibenzo(a,h)anthracene
16. indeno(1,2,3-cd)pyrene
- * contaminant

Sample:
Inj.: 10µL
Conc.: 10µg/mL each component
Sample diluent: methanol

Column: Pinnacle® II PAH
Cat.#: 9219463
Dimensions: 150mm x 3.2mm
Particle size: 4µm
Pore size: 110Å

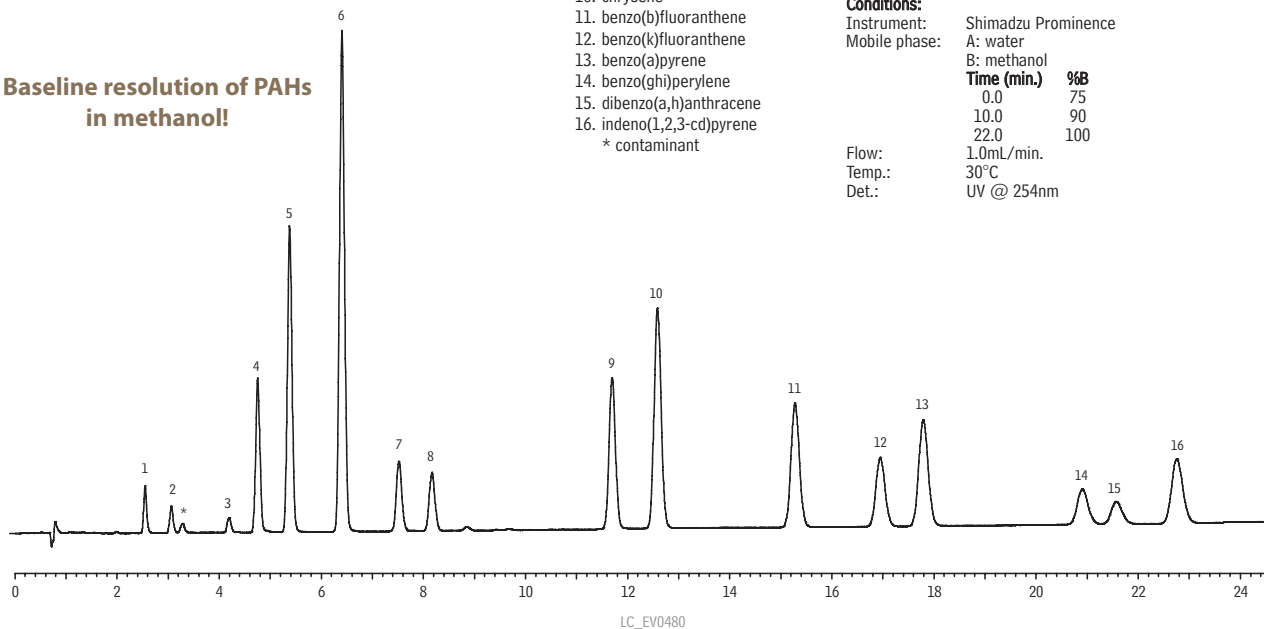
Conditions:
Instrument: Shimadzu Prominence
Mobile phase: A: water
B: methanol

Time (min.)	%B
0.0	75
10.0	90
22.0	100

Flow: 1.0mL/min.
Temp.: 30°C
Det.: UV @ 254nm



**Baseline resolution of PAHs
in methanol!**



Polycyclic Aromatic Hydrocarbons on Pinnacle® II PAH EPA 8310 – 18 component standard + benzo(j)fluoranthene

Peak List:	Retention Time
1. naphthalene	6.19
2. acenaphthylene	7.16
3. 1-methylnaphthalene	7.78
4. 2-methylnaphthalene	8.17
5. acenaphthene	8.46
6. fluorene	8.82
7. phenanthrene	9.64
8. anthracene	10.39
9. fluoranthene	11.22
10. pyrene	11.75
11. benzo(a)anthracene	13.55
12. chrysene	13.91
13. benzo(j)fluoranthene	14.92
14. benzo(b)fluoranthene	15.27
15. benzo(k)fluoranthene	15.82
16. benzo(a)pyrene	16.35
17. dibenzo(a,h)anthracene	17.10
18. benzo(ghi)perylene	17.67
19. indeno(1,2,3-cd)pyrene	17.99

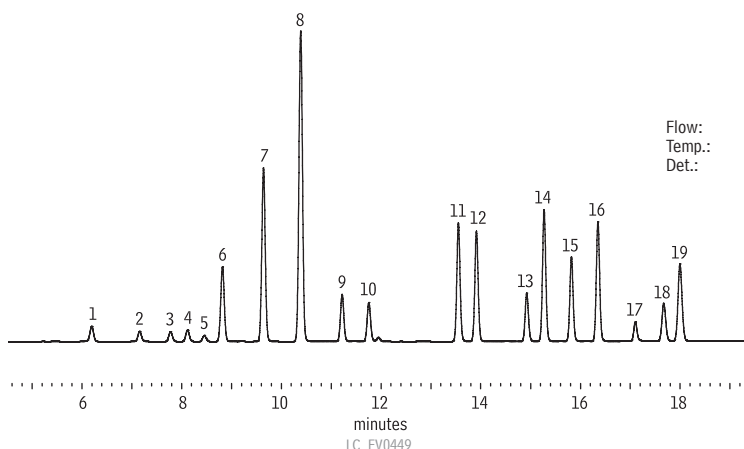
Sample:
Inj.: 10µL
Conc.: 20µg/mL each component
Sample diluent: acetonitrile

Column: Pinnacle® II PAH
Cat.#: 9219463
Dimensions: 150mm x 3.2mm
Particle size: 4µm
Pore size: 110Å

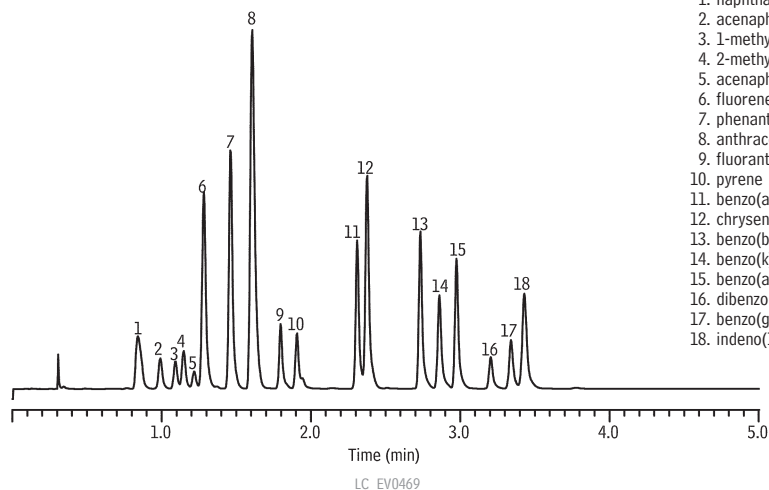
Conditions:
Instrument: Shimadzu Prominence HPLC
Mobile phase: A: purified water
B: acetonitrile

Time (min.)	%B
0	40
7	60
16	100
18.9	100
19	40

Flow: 1.2mL/min.
Temp.: 30°C
Det.: UV @ 254nm



EPA Method 610 Polycyclic Aromatic Hydrocarbons on Pinnacle® DB PAH



Peak List:

1. naphthalene
2. acenaphthylene
3. 1-methylnaphthalene
4. 2-methylnaphthalene
5. acenaphthene
6. fluorene
7. phenanthrene
8. anthracene
9. fluoranthene
10. pyrene
11. benzo(a)anthracene
12. chrysene
13. benzo(b)fluoranthene
14. benzo(k)fluoranthene
15. benzo(a)pyrene
16. dibenzo(a,h)anthracene
17. benzo(ghi)perylene
18. indeno(1,2,3-cd)pyrene

Sample:
Inj.: 2µL
Conc.: 20µg/mL each component
Sample diluent: acetonitrile

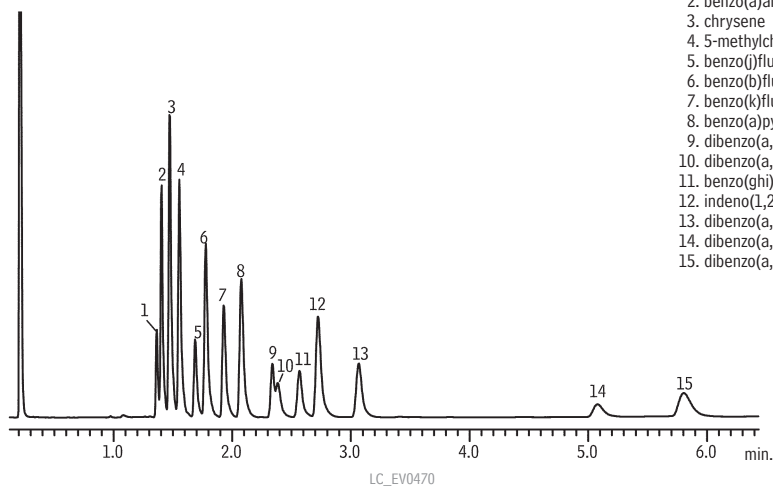
Column: Pinnacle® DB PAH
Cat. #: 9470252
Dimensions: 50mm x 2.1mm
Particle size: 1.9µm
Pore size: 140Å

Conditions:
Mobile phase: A: water
B: acetonitrile

Time (min.)	%B
0	50
1	60
3	100
5	100

Flow: 0.6mL/min.
Temp.: 30°C
Det.: UV @ 254nm

EU 256/2005 Polycyclic Aromatic Hydrocarbons on Pinnacle® DB PAH



Peak List:

1. cyclopenta(c,d)pyrene
2. benzo(a)anthracene
3. chrysene
4. 5-methylchrysene
5. benzo(j)fluoranthene
6. benzo(b)fluoranthene
7. benzo(k)fluoranthene
8. benzo(a)pyrene
9. dibenzo(a,l)pyrene
10. dibenzo(a,h)anthracene
11. benzo(ghi)perylene
12. indeno(1,2,3-cd)pyrene
13. dibenzo(a,e)pyrene
14. dibenzo(a,i)pyrene
15. dibenzo(a,h)pyrene

Sample:
Inj.: 2µL
Conc.: 20µg/mL each component
Sample diluent: acetonitrile

Column: Pinnacle® DB PAH
Cat. #: 9470252
Dimensions: 50mm x 2.1mm
Particle size: 1.9µm
Pore size: 140Å

Conditions:
Mobile phase: A: water
B: acetonitrile

Time (min.)	%B
0	50
1	90
2	95
5	100
7	100

Flow: 0.6mL/min.
Temp.: 30°C
Det.: UV @ 254nm

Carbamate Pesticides on Ultra II® Carbamate (LC/MS/MS)

NEW!

Peaks	RT (min.)	Transition 1	Transition 2
1. Aldicarb sulfone	1.9	223.1 → 86.1	223.1 → 148.0
2. Aldicarb sulfoxide	2.2	207.1 → 132.1	207.1 → 89.1
3. Oxamyl	2.4	237.1 → 72.1	237.1 → 90.1
4. Methomyl	2.6	163.1 → 88.1	163.1 → 106.0
5. 3-Hydroxycarbofuran	3.5	238.1 → 163.1	238.1 → 181.2
6. Aldicarb	4.5	208.1 → 116.0	208.1 → 88.9
7. Propoxur	5.1	210.1 → 111.0	210.1 → 168.1
8. Carbofuran	5.3	222.1 → 165.2	222.1 → 123.0
9. Carbaryl	5.8	202.1 → 145.1	202.1 → 127.1
10. Methiocarb	7.0	226.1 → 169.2	226.1 → 121.0

Column Ultra II® Carbamate (cat.# 9611312)
Dimensions: 100 mm x 2.1 mm ID
Particle Size: 3 µm
Pore Size: 100 Å
Temp.: 35 °C

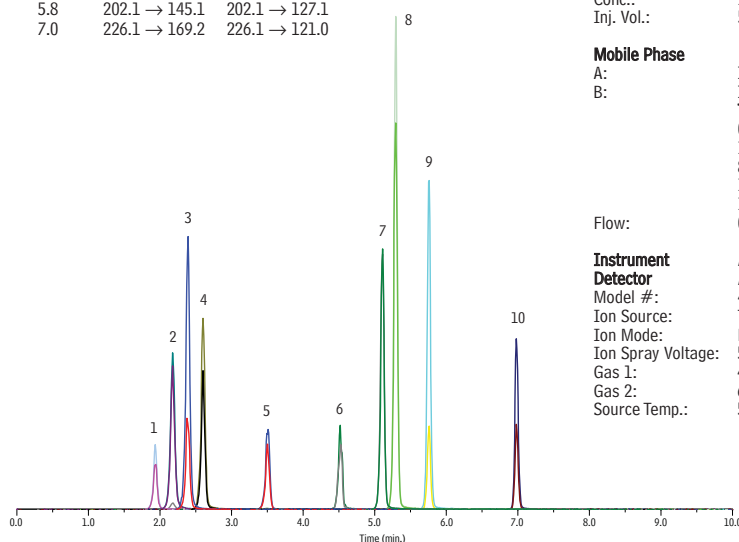
Sample 531.1 Carbamate Pesticide Calibration Mixture (cat.# 32273)
Diluent: acetonitrile
Conc.: 100 ppb each pesticide
Inj. Vol.: 5 µL

Mobile Phase
A: 10 mM NH₄OAc in water
B: 10 mM NH₄OAc in methanol

Time (min.)	%B
0	10
1	10
8	90
10	90
11	10

Flow: 0.5 mL/min.

Instrument Applied Biosystems/MDS Sciex LC/MS/MS System
Detector Applied Biosystems/MDS Sciex LC/MS/MS
Model #: 4000 QTRAP™ LC/MS/MS system
Ion Source: TurboIonSpray®
Ion Mode: ESI+
Ion Spray Voltage: 5 kV
Gas 1: 40 psi (275.8 kPa)
Gas 2: 60 psi (413.7 kPa)
Source Temp.: 500 °C



LC_EV0510

Carbamates in Orange Oil on Ultra Carbamate (LC-TOFMS)

Peak List:

1. aldicarb sulfone
2. aldicarb sulfoxide
3. oxamyl
4. methomyl
5. 3-hydroxycarbofuran
6. aldicarb
7. propoxur
8. carbofuran
9. carbaryl
10. methiocarb
11. BDMC (IS)

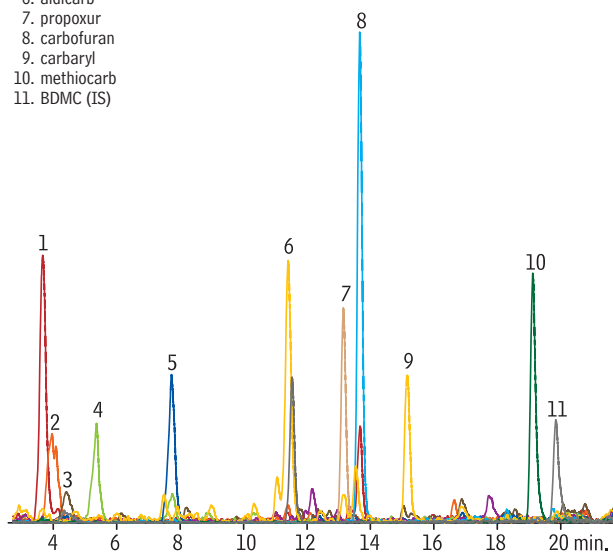
Sample: 531.1 Carbamate Pesticide Calibration Mix (cat.# 32273) and Internal Standard 4-bromo-3,5-dimethylphenyl-N-methylcarbamate (cat.# 32274) 50:50 spiked into unprocessed orange oil at 10ppm
Inj.: 3µL
Conc.: 10ppm
Sample diluent: methanol
Matrix: orange oil

Column: Ultra Carbamate
Cat. #: 9177352
Dimensions: 50mm x 2.1mm
Particle size: 3µm
Pore size: 100Å

Conditions:
Mobile phase: A: 2mM ammonium acetate:methanol, 90:10
 B: 2mM ammonium acetate:methanol, 10:90

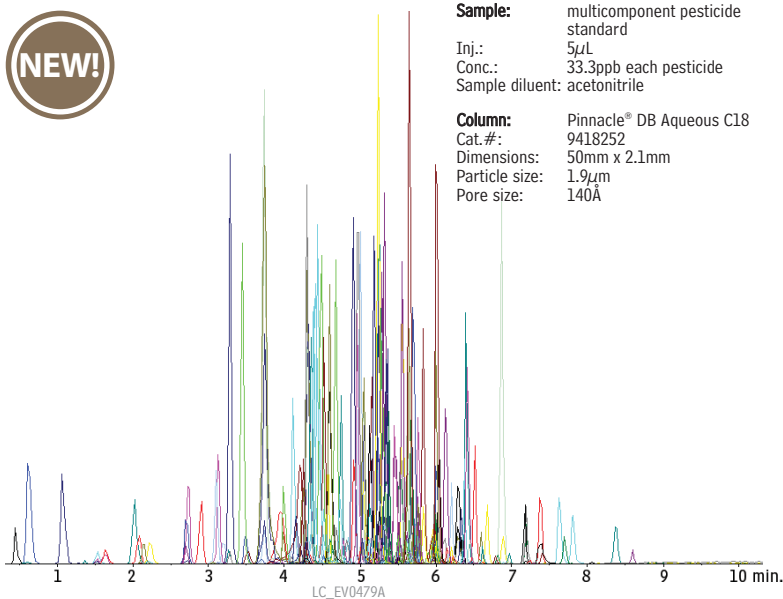
Time (min.)	%B
0	20
20	100
25	100

Flow: 200µL/min.
Temp.: ambient
Det.: LECO Unique® LC-TOFMS
Interface: ESI
Ion mode: Positive
Temp.: 130°C
Nebulizer pressure: 100kPa
Desolvation gas (N₂): 4,000cc/min.
Interface temperature: 120°C
Nozzle: (+) 62V
Capillary: (+) 2.75kV



LC_FF0472

Pesticides on Pinnacle® DB Aqueous C18 (LC/MS/MS, ESI+)



Conditions:
Mobile phase:

A: 10mM NH₄OAc in water
B: 10mM NH₄OAc in methanol

Time (min.)	%B
0.0	10
1.0	10
8.0	90
10.0	90
11.0	10

Sample: multicomponent pesticide standard
Inj.: 5µL
Conc.: 33.3ppb each pesticide
Sample diluent: acetonitrile

Column: Pinnacle® DB Aqueous C18
Cat. #: 9418252
Dimensions: 50mm x 2.1mm
Particle size: 1.9µm
Pore size: 140Å

Flow: 600µL/min.
Temp.: 35°C
Instrument: Shimadzu Prominence® UFLCXR
Det.: Applied Biosystems 4000 QTRAP® LC/MS/MS system
Ion Source: TurboIonSpray®, ESI+
IonSpray Voltage, ESI voltage: 5kV (ESI+)
Gas 1: 40psi
Gas 2: 60psi
Source Temp.: 500°C;
max pressure ~7,200psi

Peak List:

Compound	Polarity	Mol. Wt.	RT (min.)	Transition 1
methamidophos	positive	141.13	0.45	142.0 → 94.0
acephate	positive	183.17	0.62	184.0 → 142.8
bentazone	negative	240.28	0.77	239.0 → 131.8
omethoate	positive	213.14	1.07	214.0 → 124.9
bromoxynil	negative	276.91	1.32	275.9 → 80.8
butoxycarboxin	positive	222.27	1.64	223.1 → 86.1
aldicarb sulfoxide	positive	206.26	2.03	207.1 → 132.1
methomyl	positive	162.21	2.08	163.1 → 88.1
Ioxynil	negative	370.92	2.46	369.8 → 126.7
thiamethoxam	positive	291.7	2.7	292.0 → 211.0
monocrotophos	positive	223.17	2.73	224.1 → 127.0
dimethoate	positive	229.26	2.9	230.1 → 199.0
fenuron	positive	164.21	3.1	165.1 → 72.1
dioxacarb	positive	223.23	3.12	224.0 → 123.0
dicrotophos	positive	237.19	3.28	238.0 → 112.0
vamidothion	positive	287.34	3.45	288.0 → 146.0
carbendazim	positive	191.19	3.73	192.0 → 160.0
aldicarb	positive	190.27	3.73	208.1 → 116.0
formetanate	positive	221.26	3.74	222.1 → 165.2
acetamiprid	positive	222.67	3.95	223.1 → 126.1
carbetamide	positive	236.27	3.99	237.0 → 192.0
oxamyl	positive	219.26	3.99	237.1 → 72.2
aminocarb	positive	208.26	4.11, 4.44	209.2 → 137.1
propoxur	positive	209.24	4.15	210.1 → 111.0
oxadixyl	positive	278.31	4.21	279.0 → 219.0
bendiocarb	positive	223.23	4.24	224.1 → 109.1
thiacloprid	positive	252.71	4.25	253.2 → 126.1
thiophanate methyl	positive	342.4	4.3	343.0 → 151.0
methabenzthiazuron	positive	221.28	4.31	222.0 → 165.1
tricyclazole	positive	189.23	4.35	190.0 → 163.0
pyracarbolid	positive	217.27	4.38	218.2 → 125.0
propamocarb	positive	188.27	4.41	189.2 → 102.2
carboxin	positive	235.3	4.51	236.0 → 143.0
ethiofencarb	positive	225.31	4.52	226.1 → 106.9
carbaryl	positive	201.22	4.58	202.1 → 145.1
thiabendazole	positive	201.25	4.6	202.0 → 175.0
carbanilide	positive	212.25	4.6	213.1 → 94.0
clethodim	positive	359.91	4.61	360.0 → 164.0
tebuthiuron	positive	228.32	4.68	229.2 → 172.4

Compound	Polarity	Mol. Wt.	RT (min.)	Transition 1
fluometuron	positive	232.21	4.75	233.1 → 72.0
metobromuron	positive	259.1	4.82	259.0 → 170.2
flutriafol	positive	301.3	4.84	302.0 → 123.0
chlortoluron	positive	212.68	4.92	213.1 → 72.2
simetryn	positive	213.31	4.96	214.0 → 124.0
pirimicarb	positive	238.29	4.97	239.2 → 72.1
forchlorfenuron	positive	247.68	5.04	248.0 → 129.1
siduron	positive	232.32	5.09	233.3 → 137.2
ethofumesate	positive	286.35	5.11	304.0 → 121.0
cycluron	positive	198.31	5.13	199.1 → 89.1
diuron	positive	233.1	5.13	233.1 → 72.0
diethofencarb	positive	267.33	5.15	268.0 → 226.0
furalaxyl	positive	301.34	5.18	302.2 → 95.0
methiocarb	positive	225.31	5.24	226.1 → 169.2
sebumeton	positive	225.29	5.24	226.2 → 169.9
terbumeton	positive	225.29	5.25	226.2 → 169.9
prometon	positive	225.29	5.26	226.2 → 142.3
paclobutrazol	positive	293.8	5.26	294.0 → 70.0
promecarb	positive	207.27	5.27	208.2 → 109.2
dimoxystrobin	positive	326.39	5.27	327.1 → 205.0
ametryn	positive	227.33	5.29	228.2 → 186.2
methoprotetryne	positive	271.39	5.32	272.2 → 240.2
triadimefon	positive	293.75	5.32	294.0 → 197.0
mexacarbate	positive	222.28	5.34	223.2 → 166.2
fludioxinil	negative	248.19	5.34	247.0 → 179.9
boscalid	negative	343.21	5.36	343.0 → 307
azoxystrobin	positive	403.3	5.36	404.1 → 372.1
methoxyfenozide	positive	368.47	5.38	369.0 → 149.0
cyproconazole	positive	291.78	5.39	292.2 → 70.2
prothioconazole	negative	344.26	5.41	341.9 → 305.8
flufenacet	positive	363.34	5.46	364.0 → 152.0
butafenacil	positive	474.82	5.47	492.2 → 331.1
myclobutanil	positive	288.78	5.51	289.0 → 70.0
dimethomorph	positive	387.86	5.52, 5.54	388.0 → 301.0
bromuconazole 47	positive	377.06	5.54	378.0 → 159.0
prometryn	positive	241.36	5.55	242.2 → 158.1
fipronil	negative	437.15	5.56	434.9 → 329.8
triticinazole	positive	317.81	5.58	318.0 → 70.0
tetraconazole	positive	372.12	5.6	372.0 → 159.0
uniconazole	positive	291.78	5.62	292.2 → 70.2
fluoxastrobin	positive	458.83	5.62	459.2 → 427.2
cyazofamid	positive	324.78	5.63	325.0 → 108.0
terbutryn	positive	241.36	5.65	242.2 → 186.0
tebufenozide	positive	352.47	5.65	353.1 → 133.1
chloroxuron	positive	290.75	5.67	291.0 → 72.0
picoxystrobin	positive	367.25	5.67	368.0 → 145.0
carfentrazone-ethyl	positive	412.17	5.69	412.0 → 346.0
diclobutrazol	positive	328.21	5.71	328.0 → 70.0
fenoxycarb	positive	301.34	5.72	302.0 → 88.1
diflubenzuron	positive	310.67	5.72	311.2 → 158.1
neburon	positive	275.18	5.74	275.0 → 88.0
flusiazole	positive	315.4	5.76	316.0 → 247.0
epoxiconazole	positive	329.76	5.76	330.0 → 121.0
fenbuconazole	positive	336.82	5.76	337.0 → 125.0
bupirimate	positive	316.41	5.77	317.0 → 166.0
zoxamide	positive	336.54	5.77	336.2 → 187.1
rotenone	positive	394.42	5.79	395.0 → 213.0
benalaxyl	positive	325.41	5.83	326.0 → 148.0
tebuconazole	positive	307.82	5.84	308.0 → 70.0
penconazole	positive	284.19	5.93	284.0 → 159.0
cyprodinil	positive	225.29	5.96	226.0 → 93.0
propiconazole	positive	342.22	5.96	342.0 → 159.0
alanycarb	positive	399.52	5.98	400.1 → 238.2
triflumuron	positive	358.68	5.99	359.1 → 156.1
thiobencarb	positive	257.78	6	258.1 → 125.0
pyraclostrobin	positive	387.83	6	388.0 → 194.0
benzoximate	positive	363.8	6.01	364.0 → 199.0
pinoxaden	positive	400.52	6.01	401.3 → 317.2
clofentezine	positive	303.15	6.11	303.0 → 138.0
trifloxystrobin	positive	408.38	6.12	409.2 → 186.0
prochloraz	positive	376.67	6.21	376.0 → 308.0
difenoconazole	positive	406.28	6.29	406.0 → 251.0
benfuracarb	positive	410.53	6.29	411.2 → 195.1
triflumizole	positive	345.75	6.38	346.1 → 278.1
buprofezin	positive	305.44	6.4	306.0 → 201.0
piperonyl butoxide	positive	338.45	6.42	356.2 → 177.2
pyriproxyfen	positive	321.28	6.52	322.0 → 96.0
propargite	positive	350.48	6.68	368.0 → 231.0
etoxazole	positive	359.42	6.87	360.1 → 141.0
amitraz	positive	293.41	6.89	294.2 → 163.3
noviflumuron	negative	529.1	7.08	527.1 → 343.8
pyridaben	positive	364.94	7.18	365.0 → 147.0
fenpyroximate	positive	421.5	7.2	422.0 → 366.0
fenpyromorph	positive	303.49	7.38	304.0 → 147.0
spiroxamine	positive	297.48	7.63, 7.81	298.0 → 144.0
spinosyn A	positive	731.97	8.37	732.6 → 142.2

Pesticides on Ultra Aqueous C18 (LC/MS/MS)



Sample: multicomponent pesticide standard
Inj.: 10 µL
Conc.: 1ppb each pesticide
Sample diluent: acetonitrile

Column: Ultra Aqueous C18
Cat. #: 9178312
Dimensions: 100mm x 2.1mm
Particle size: 3 µm
Pore size: 100 Å

Conditions:
Instrument: Shimadzu Prominence® UFLCxx
Mobile phase: A: 10 mM NH₄OAc in water
B: 10 mM NH₄OAc in methanol

Time (min.)	%B
0.0	20
8.0	90
12.0	100
14.8	100
14.9	20

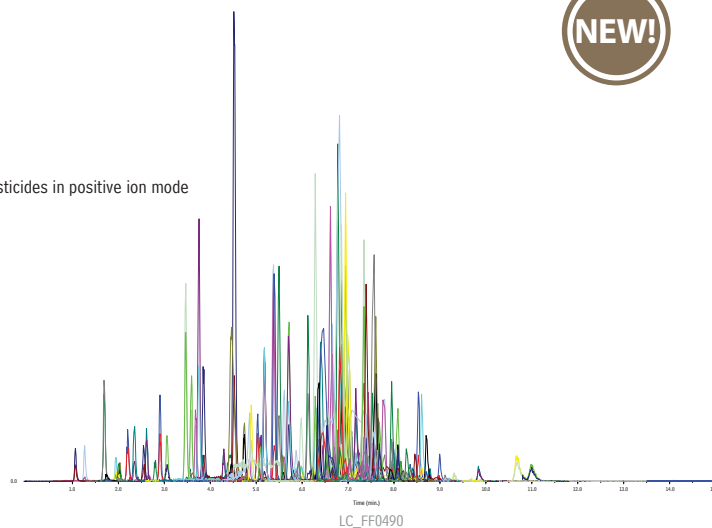
Flow: 500 µL/min
Temp.: 35°C

Det.: Applied Biosystems 4000 QTRAP® LC/MS/MS system
Ion Source: TurboIonSpray®

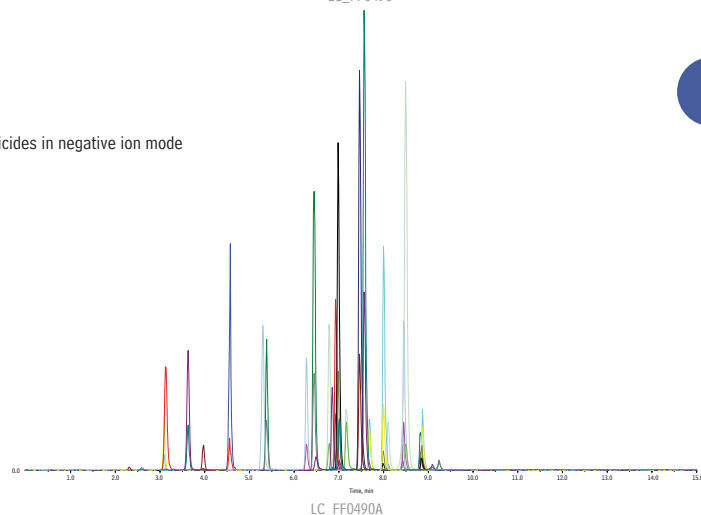
A & C: ESI+
B: ESI-

IonSpray Voltage: 5kV (ESI+), -4.2kV (ESI-)
Gas 1: 50psi
Gas 2: 60psi
Source Temp.: 600°C

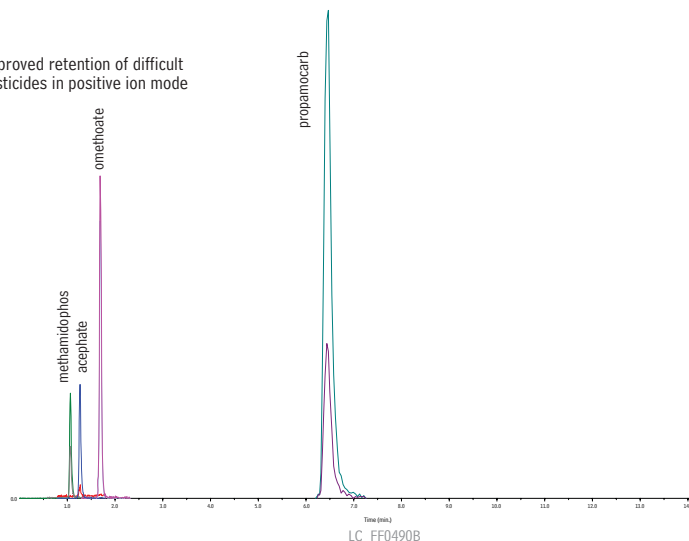
A: Pesticides in positive ion mode



B: Pesticides in negative ion mode



C: Improved retention of difficult pesticides in positive ion mode



for
more
info

Visit www.restek.com/cat005 to view our "Comprehensive Pesticide Residue Analysis by LC/MS/MS Using an Ultra Aqueous C18 Column" article (contains compound identifications and MS details).

Pesticides on Pinnacle® DB Aqueous C18 (LC/MS/MS, ESI-)

NEW!

Peak List:

Compound	Polarity	Mol. Wt.	RT (min.)	Transition 1
bentazone	negative	240.28	0.77	239.0 → 131.8
bromoxynil	negative	276.91	1.32	275.9 → 80.8
Ioxynil	negative	370.92	2.46	369.8 → 126.7
fludioxinil	negative	248.19	5.34	247.0 → 179.9
boscalid	negative	343.21	5.36	343.0 → 307
prothioconazole	negative	344.26	5.41	341.9 → 305.8
fipronil	negative	437.15	5.56	434.9 → 329.8
noviflumuron	negative	529.1	7.08	527.1 → 343.8

Sample: multicomponent pesticide standard
Inj.: 5µL
Conc.: 33.3ppb each pesticide
Sample diluent: acetonitrile

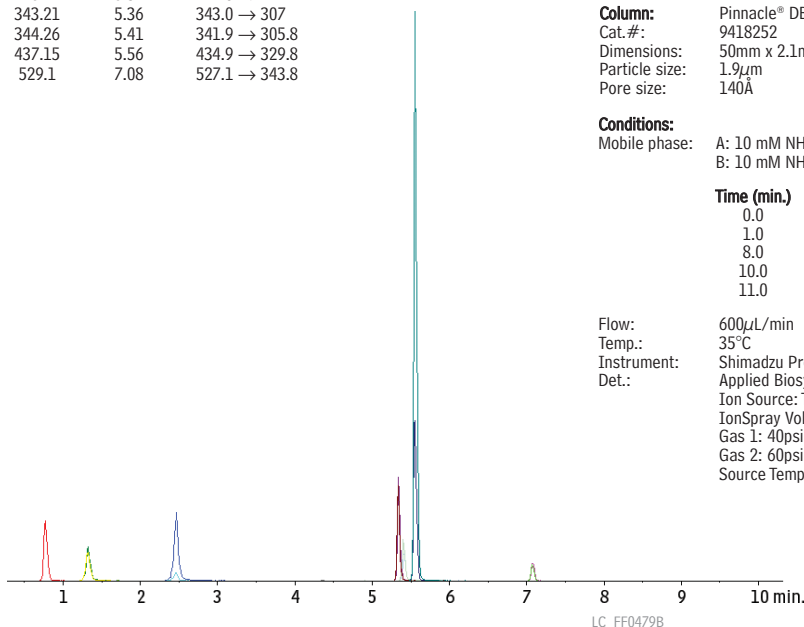
Column: Pinnacle® DB Aqueous C18
Cat. #: 9418252
Dimensions: 50mm x 2.1mm
Particle size: 1.9µm
Pore size: 140Å

Conditions:

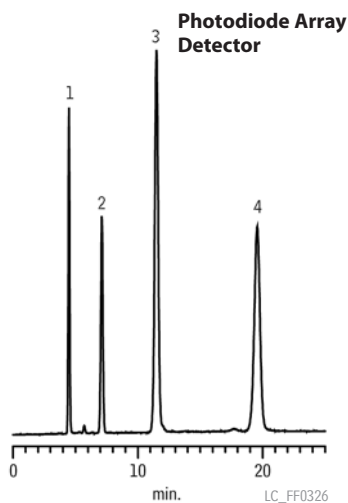
Mobile phase: A: 10 mM NH₄OAc in water
 B: 10 mM NH₄OAc in methanol

Time (min.)	%B
0.0	10
1.0	10
8.0	90
10.0	90
11.0	10

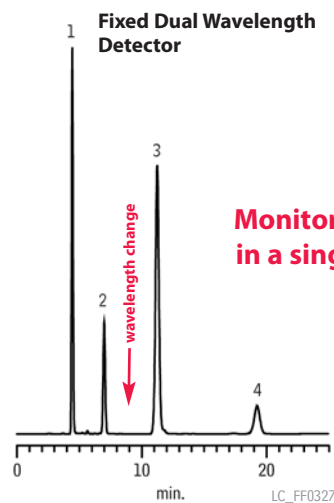
Flow: 600µL/min
Temp.: 35°C
Instrument: Shimadzu Prominence® UFLCXR
Det.: Applied Biosystems 4000 QTRAP® LC/MS/MS system
 Ion Source: TurboIonSpray®, ESI-
 IonSpray Voltage, ESI voltage: -4.2kV (ESI-)
 Gas 1: 40psi
 Gas 2: 60psi
 Source Temp.: 500°C; max pressure ~7,200psi



Sudan Dyes on Ultra Aqueous C18



1. Sudan I
 2. Sudan II
 3. Sudan III
 4. Sudan IV



**Monitor Sudan I, II, III, and IV
 in a single, isocratic analysis!**

Sample:

Inj.: 20µL, mixture of Sudan I, Sudan II, Sudan III, Sudan IV
Conc.: 20µg/mL each component
Sample diluent: methanol

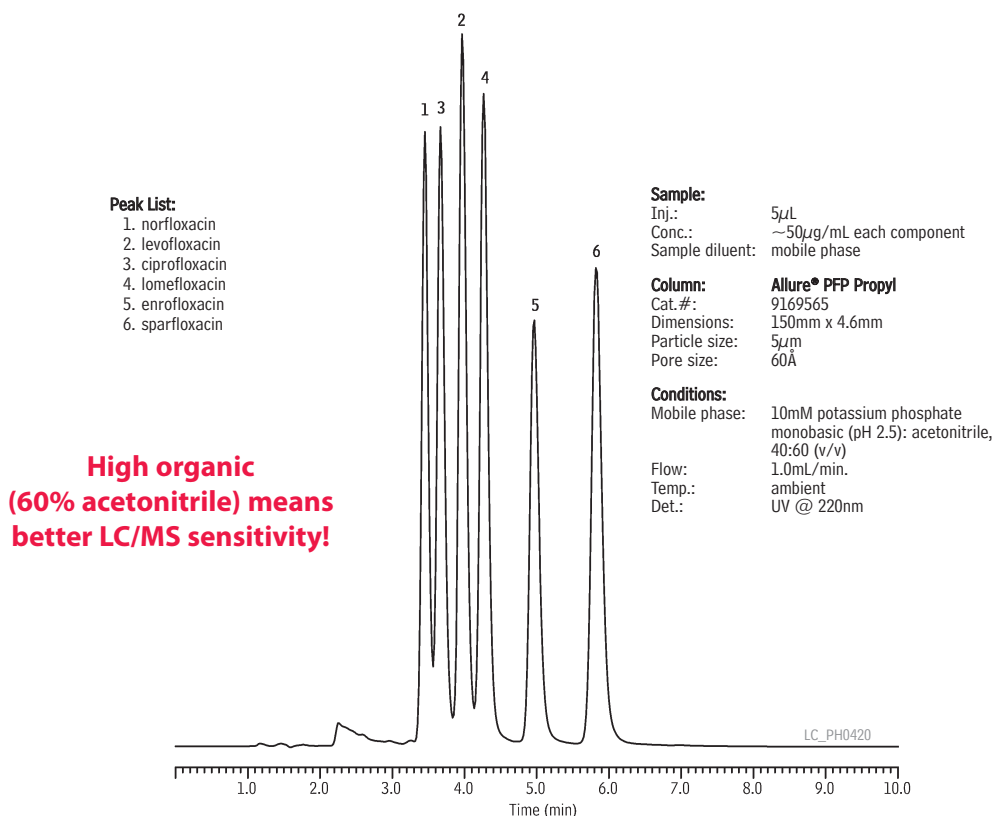
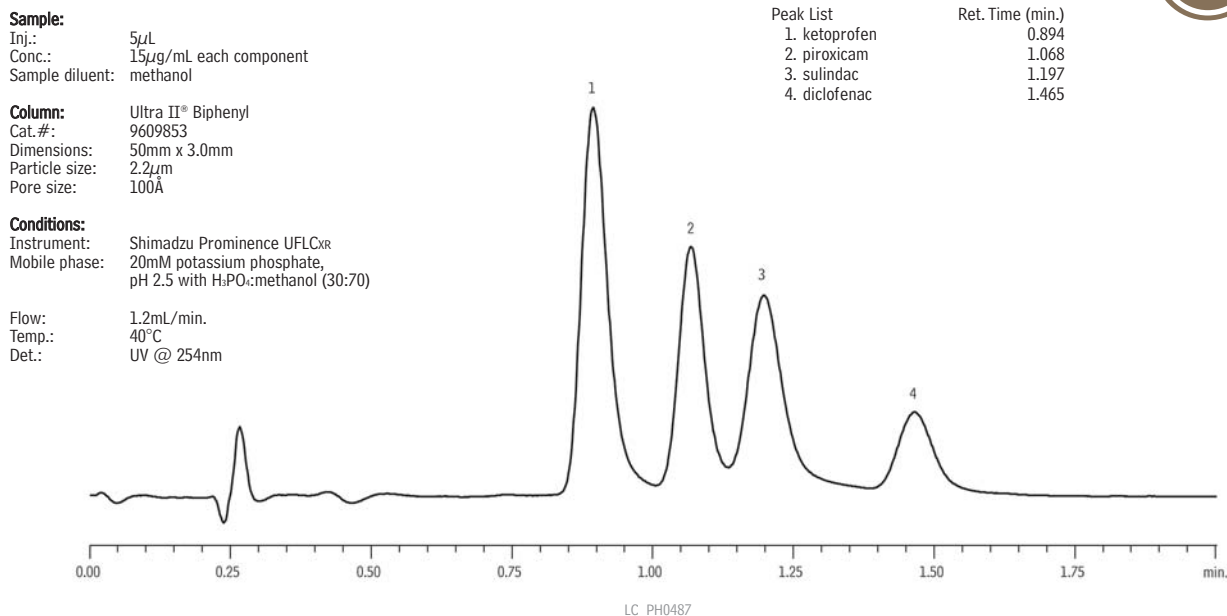
Column:

Ultra Aqueous C18
Cat. #: 9178565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

Mobile phase: methanol:water, 97:3
Flow: 1mL/min.
Temp.: ambient
Det.: UV @ 476/493/512/357nm (left) or UV @ 488/520nm (right)

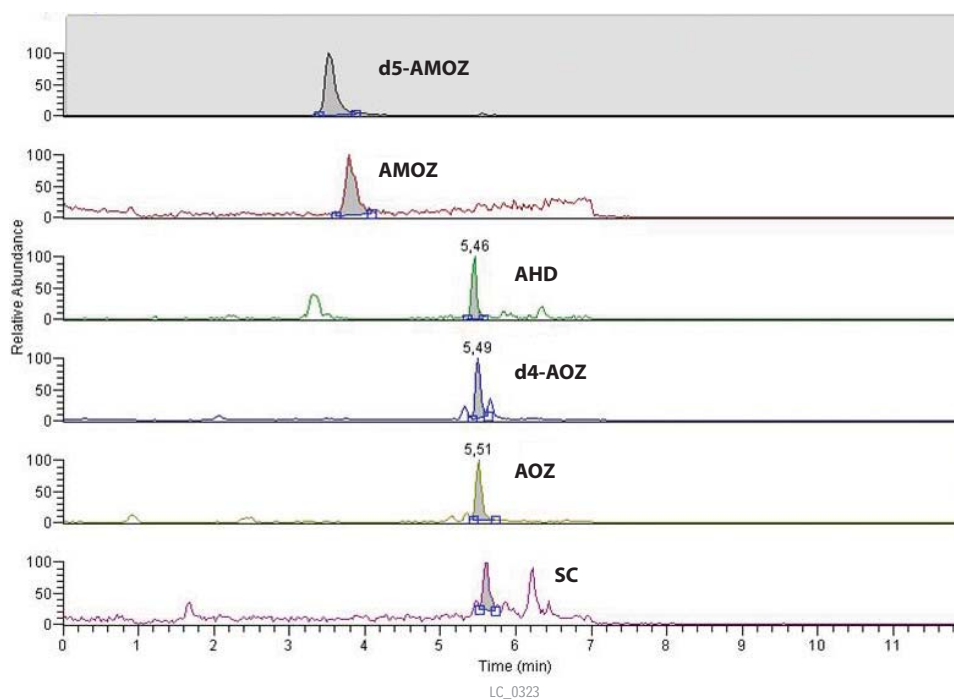
Antibiotic Fluoroquinolones on Allure® PFP Propyl


Nonsteroidal Anti-inflammatory Drugs (NSAIDs)
Ultra II® Biphenyl


For more information on Biphenyl columns, visit

www.restek/biphenyl

Nitrofuran Metabolites on Ultra C18 (LC/MS/MS)



Peak List:	Conc. (ppb)	Time (min)
1. d5-AMAZ	0.3	3.7
2. AMAZ	0.3	3.8
3. AHD	0.3	5.46
4. d4-AOZ	0.3	5.49
5. AOZ	0.3	5.51
6. SC	0.3	5.6

Column: Ultra C18
 Cat. #: 9174312
 Dimensions: 100mm x 2.1mm
 Particle size: 3µm
 Pore size: 100Å

Conditions:
 Mobile phase: A: 0.05% formic acid in methanol
 B: 0.05% formic acid – 5 mM NH₄ formate in water

Time (min)	%B
0	90
2.5	90
5	10
10	10
12	90
15	90

Flow: 200µL/min.
 Temp.: 30°C
 Det.: MS/MS triple quadrupoles (Thermo Scientific Discovery)

Analyzer Parameters:

Ion source: ESI (electrospray ionization)
 Only segment: 15 min.
 Polarity: positive
 Data type: centroid
 Scan mode: SRM product
 Scan width (m/z): 0.7
 Scan time (s): 0.25
 Peak width: Q1: within 0.7
 Q2: 0.7
 Collision gas pressure (mTorr): 1.5 (argon)
 Divert valve: active, with 3 positions
 Positions-1° 2 min., 2° 8 min., 3° 5 min.

Analyte	Prec. Ion	Prod. Ion	Collision E	Tube Lens
AOZ	236	134	12 V	120
AMAZ	335	291	10 V	100
SC	209	166	12 V	80
AHD	249	134	12 V	110

AMAZ = 3-amino-5-morpholinomethyl-2-oxazolidinone
 AHD = 1-aminohydantoin hydrochloride
 AOZ = 3-amino-2-oxazolidinone
 SC = semicarbazide



for more info

Visit www.restek.com/cat004 to view our "Analysis of Nitrofurans in Honey Using LC/MS/MS and an Ultra C18 Column" article.

Sulfonamides in Milk on Pinnacle® DB Biphenyl (LC-TOFMS)

NEW!

Sample: milk spiked at 200ppb with sulfonamides, extracted with Q-sep™ Q110 QuEChERS extraction tube (cat.# 26213), and cleaned up with Q-sep™ Q211 QuEChERS dSPE clean-up tube (cat.# 26216), then concentrated.

Inj.: 10µL
Conc.: 4µg/mL
Sample diluent: 0.2% formic acid

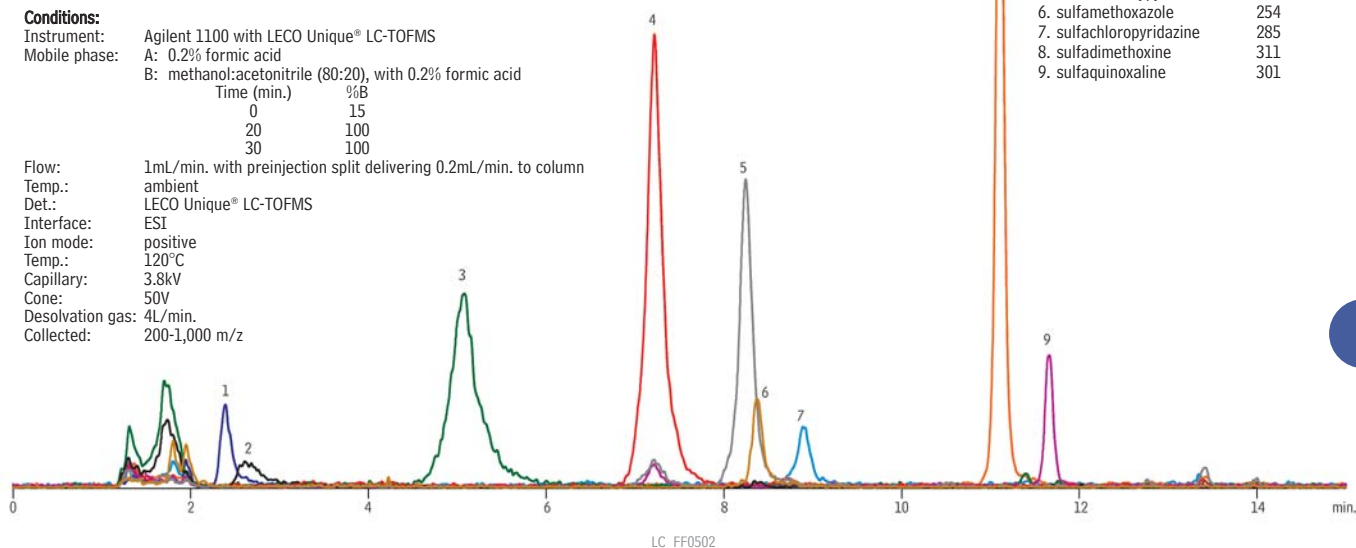
Column: Pinnacle® DB Biphenyl
Cat. #: 9409312
Dimensions: 100mm x 2.1mm
Particle size: 3µm
Pore size: 140Å

Conditions:
Instrument: Agilent 1100 with LECO Unique® LC-TOFMS
Mobile phase: A: 0.2% formic acid
B: methanol:acetonitrile (80:20), with 0.2% formic acid

Time (min.)	%B
0	15
20	100
30	100

Flow: 1mL/min. with preinjection split delivering 0.2mL/min. to column
Temp.: ambient
Det.: LECO Unique® LC-TOFMS
Interface: ESI
Ion mode: positive
Temp.: 120°C
Capillary: 3.8kV
Cone: 50V
Desolvation gas: 4L/min.
Collected: 200-1,000 m/z

Compound	[M+H] ⁺
1. sulfadiazine	251
2. sulfathiazole	256
3. sulfamerazine	265
4. sulfamethazine	279
5. sulfamethoxypyridazine	281
6. sulfamethoxazole	254
7. sulfachloropyridazine	285
8. sulfadimethoxine	311
9. sulfaquinoxaline	301



Sulfa Drugs Ultra II® Biphenyl

NEW!

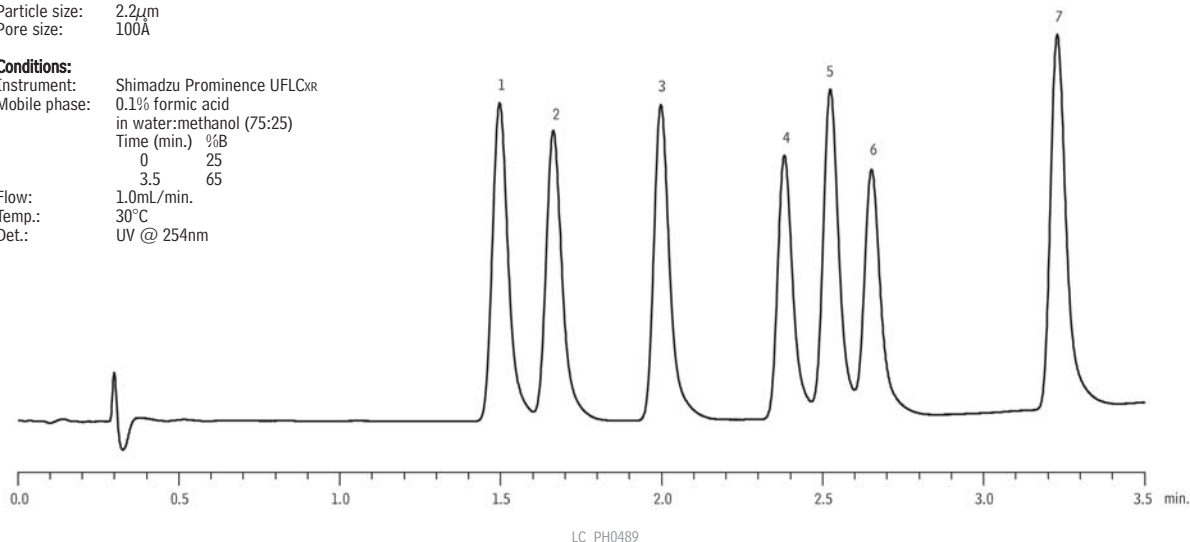
Sample:
Inj.: 3µL
Conc.: 25µg/mL each component
Sample diluent: methanol

Column: Ultra II® Biphenyl
Cat. #: 9609853
Dimensions: 50mm x 3.0mm
Particle size: 2.2µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCXR
Mobile phase: 0.1% formic acid
in water:methanol (75:25)
Time (min.) %B
0 25
3.5 65

Flow: 1.0mL/min.
Temp.: 30°C
Det.: UV @ 254nm

Peak List	Ret. Time (min.)
1. sulfadiazine	1.496
2. sulfathiazole	1.663
3. sulfamerazine	1.997
4. sulfamethoxazole	2.381
5. sulfamethazine	2.523
6. sulfachloropyridazine	2.651
7. sulfamethoxine	3.228





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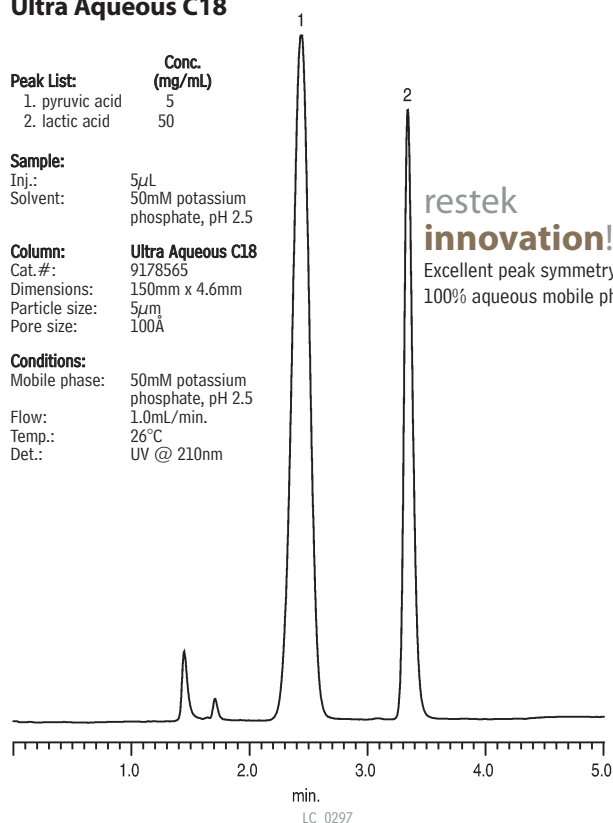
Carboxylic Acids (Pyruvic and Lactic) on Ultra Aqueous C18

Peak List:	Conc. (mg/mL)
1. pyruvic acid	5
2. lactic acid	50

Sample:
Inj.: 5µL
Solvent: 50mM potassium phosphate, pH 2.5

Column: Ultra Aqueous C18
Cat. #: 9178565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: 50mM potassium phosphate, pH 2.5
Flow: 1.0mL/min.
Temp.: 26°C
Det.: UV @ 210nm



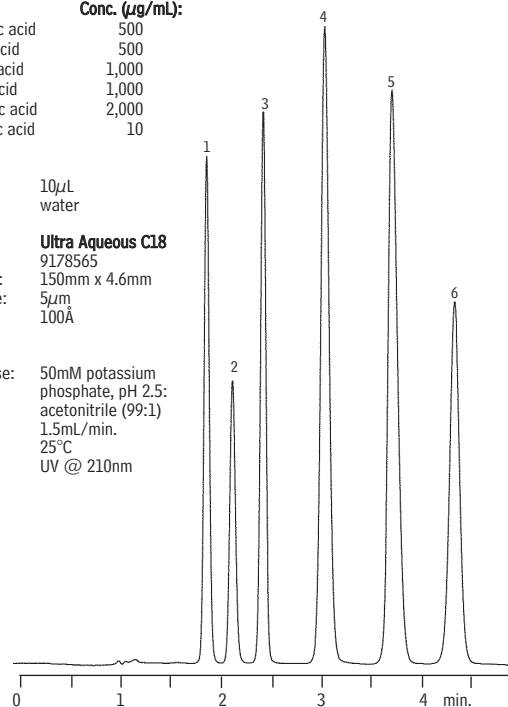
Carboxylic Acids on Ultra Aqueous C18

Peak List:	Conc. (µg/mL):
1. malonic acid	500
2. lactic acid	500
3. acetic acid	1,000
4. citric acid	1,000
5. succinic acid	2,000
6. fumaric acid	10

Sample:
Inj.: 10µL
Solvent: water

Column: Ultra Aqueous C18
Cat. #: 9178565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: 50mM potassium phosphate, pH 2.5; acetonitrile (99:1)
Flow: 1.5mL/min.
Temp.: 25°C
Det.: UV @ 210nm



Phenolic Antioxidants on Pinnacle® II C18

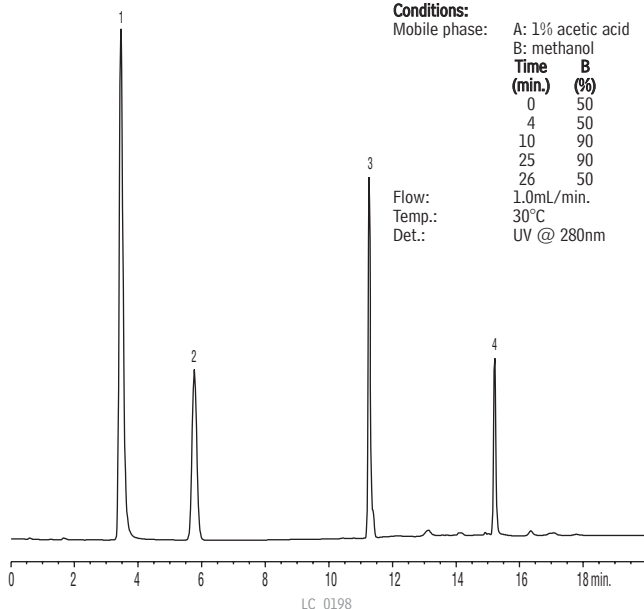
Peak List:	Conc. (ppm)
1. propyl gallate	168
2. TBHQ	182
3. 2-BHA + 3-BHA	197
4. BHT	193

Sample:
Inj.: 10 µL
Solvent: methanol
Column: Pinnacle® II C18
Cat. #: 9214565
Dimensions: 150mm x 4.6mm
Particle size: 5 µm
Pore size: 110 Å

Conditions:
Mobile phase: A: 1% acetic acid
B: methanol

Time (min.)	B (%)
0	50
4	50
10	90
25	90
26	50

Flow: 1.0 mL/min.
Temp.: 30°C
Det.: UV @ 280nm



ChromaBLOGraphy

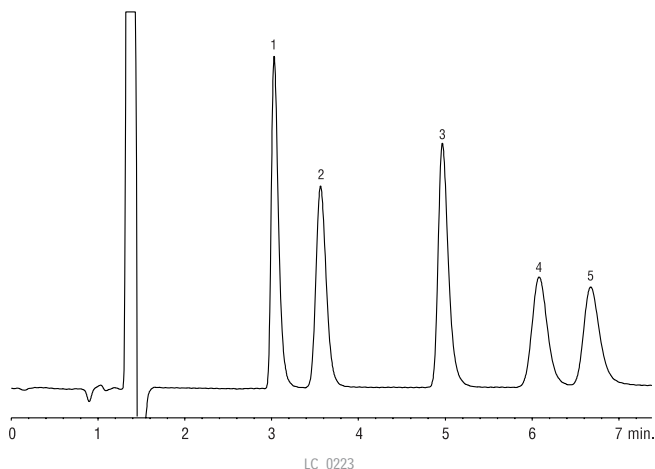
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Sugars on Pinnacle® II Amino (3 µm)

Peak List:	Conc. (mg/mL)
1. fructose	2.0
2. glucose	2.1
3. sucrose	4.0
4. maltose	4.5
5. lactose	4.4

Sample:
Inj.: 5 µL
Solvent: mobile phase
Column: Pinnacle® II Amino
Cat. #: 9217365
Dimensions: 150mm x 4.6mm
Particle size: 3 µm
Pore size: 110 Å
Conditions:
Mobile phase: water:acetonitrile (25:75, v/v)
Flow: 1.5 mL/min.
Temp.: 35°C
Det.: refractive index @ 35°C



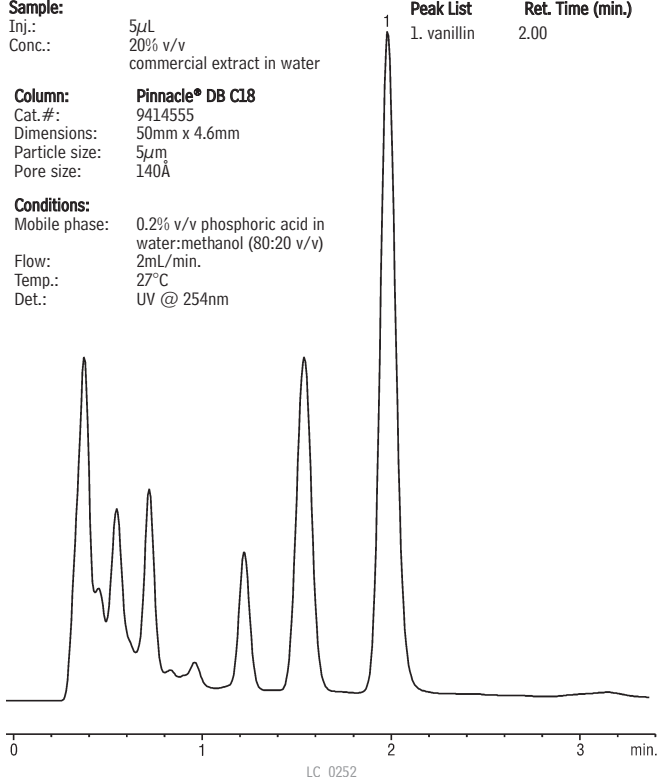
Vanilla Bean Extract on Pinnacle® DB C18 (Fast LC)

Sample:
Inj.: 5 µL
Conc.: 20% v/v commercial extract in water

Column: Pinnacle® DB C18
Cat. #: 9414555
Dimensions: 50mm x 4.6mm
Particle size: 5 µm
Pore size: 140 Å

Conditions:
Mobile phase: 0.2% v/v phosphoric acid in water:methanol (80:20 v/v)
Flow: 2 mL/min.
Temp.: 27°C
Det.: UV @ 254nm

Peak List
1. vanillin
Ret. Time (min.)
2.00





Vanillin on Ultra C8

Sample:
Inj.: 10mL
Conc.: 5% solution of vanilla extract
Solvent: 40% ethanol

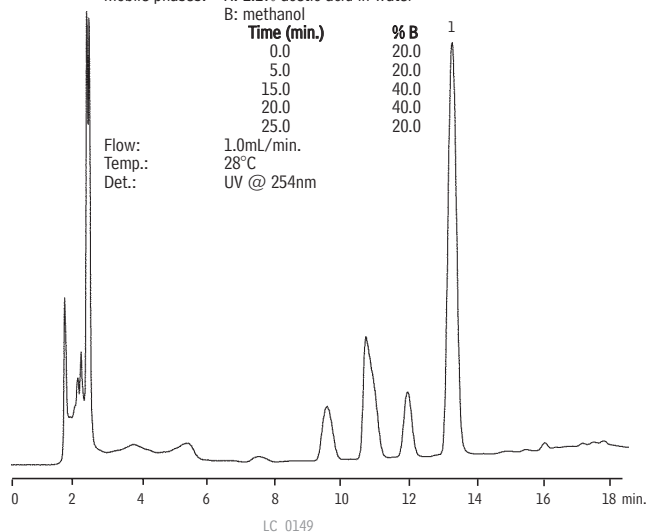
Peak List:
1. vanillin

Column: Ultra C8
Cat. #: 9103565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phases: A: 1.2% acetic acid in water
B: methanol

Time (min.)	% B
0.0	20.0
5.0	20.0
15.0	40.0
20.0	40.0
25.0	20.0

Flow: 1.0mL/min.
Temp.: 28°C
Det.: UV @ 254nm



Vanillin and Ethyl Vanillin on Ultra C8

Peak List:
1. vanillin
2. ethyl vanillin

Conc. (mg/mL)
0.12
0.04

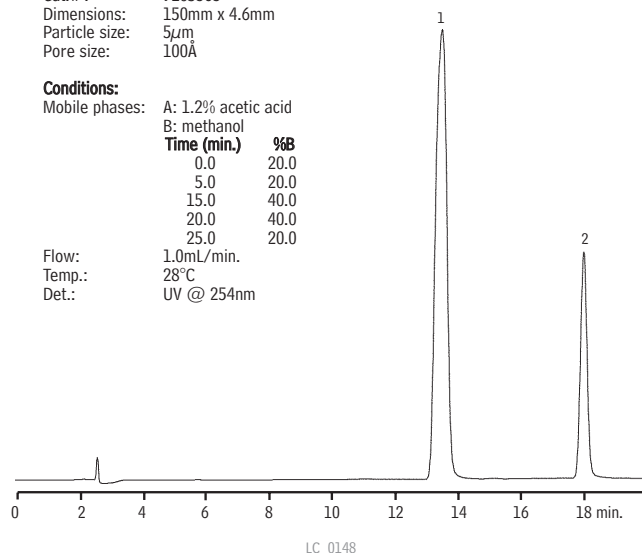
Sample:
Inj.: 10µL
Solvent: 40% ethanol

Column: Ultra C8
Cat. #: 9103565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phases: A: 1.2% acetic acid
B: methanol

Time (min.)	%B
0.0	20.0
5.0	20.0
15.0	40.0
20.0	40.0
25.0	20.0

Flow: 1.0mL/min.
Temp.: 28°C
Det.: UV @ 254nm



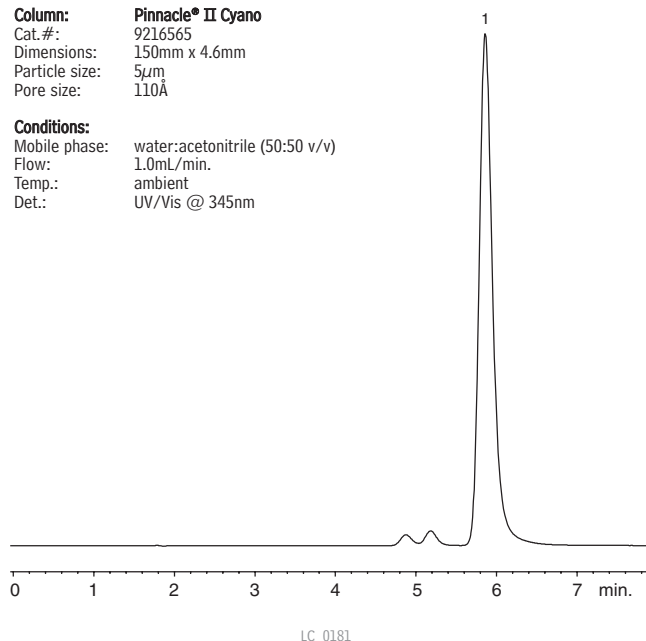
Black Pepper: Piperine on Pinnacle® II Cyano

Peak List:
1. piperine

Sample:
Inj.: 5µL
Conc.: 100µg/mL
Solvent: methanol

Column: Pinnacle® II Cyano
Cat. #: 9216565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 110Å

Conditions:
Mobile phase: water:acetonitrile (50:50 v/v)
Flow: 1.0mL/min.
Temp.: ambient
Det.: UV/Vis @ 345nm



Capsaicinoids: Heat Level Assay for Habañero Nuggets on Pinnacle® II C18

Peak List:
1. ethanol
2. unknown
3. capsaicin
4. dihydrocapsaicin

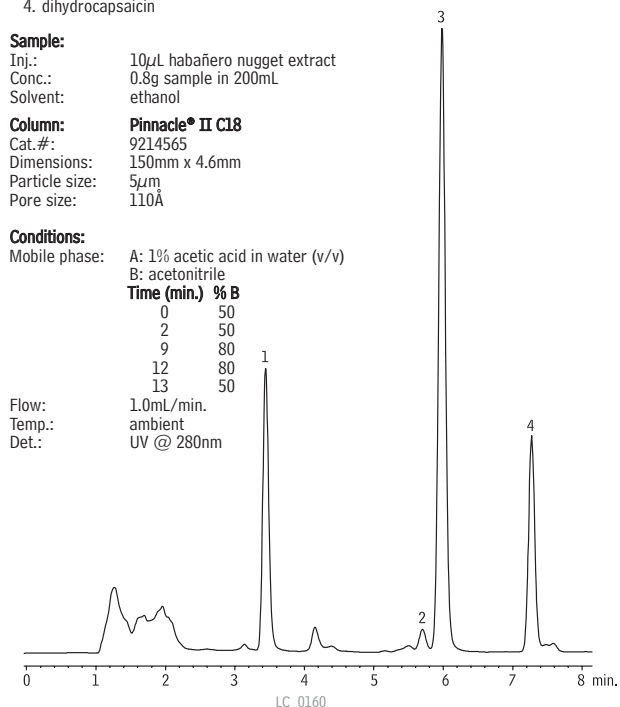
Sample:
Inj.: 10µL habaño nugget extract
Conc.: 0.8g sample in 200mL
Solvent: ethanol

Column: Pinnacle® II C18
Cat. #: 9214565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 110Å

Conditions:
Mobile phase: A: 1% acetic acid in water (v/v)
B: acetonitrile

Time (min.)	% B
0	50
2	50
9	80
12	80
13	50

Flow: 1.0mL/min.
Temp.: ambient
Det.: UV @ 280nm



Melatonin

Ultra II® Aqueous C18

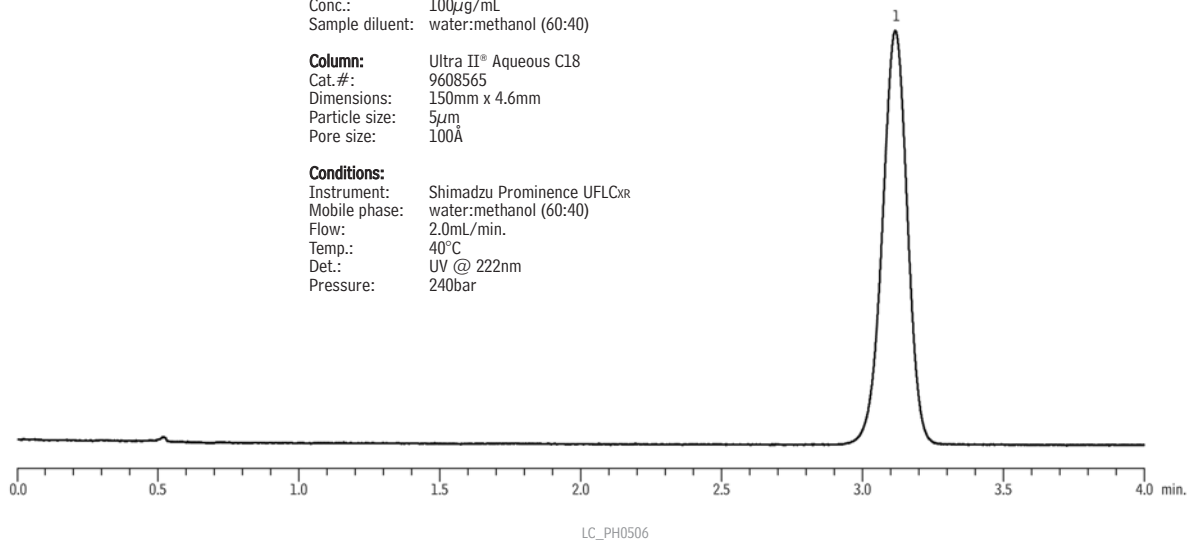
NEW!

Peak List	Ret. Time (min.)
1. melatonin	3.117

Sample:
Inj.: 1µL
Conc.: 100µg/mL
Sample diluent: water:methanol (60:40)

Column: Ultra II® Aqueous C18
Cat.#: 9608565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCxr
Mobile phase: water:methanol (60:40)
Flow: 2.0mL/min.
Temp.: 40°C
Det.: UV @ 222nm
Pressure: 240bar



Organic Acids

Ultra II® Aqueous C18

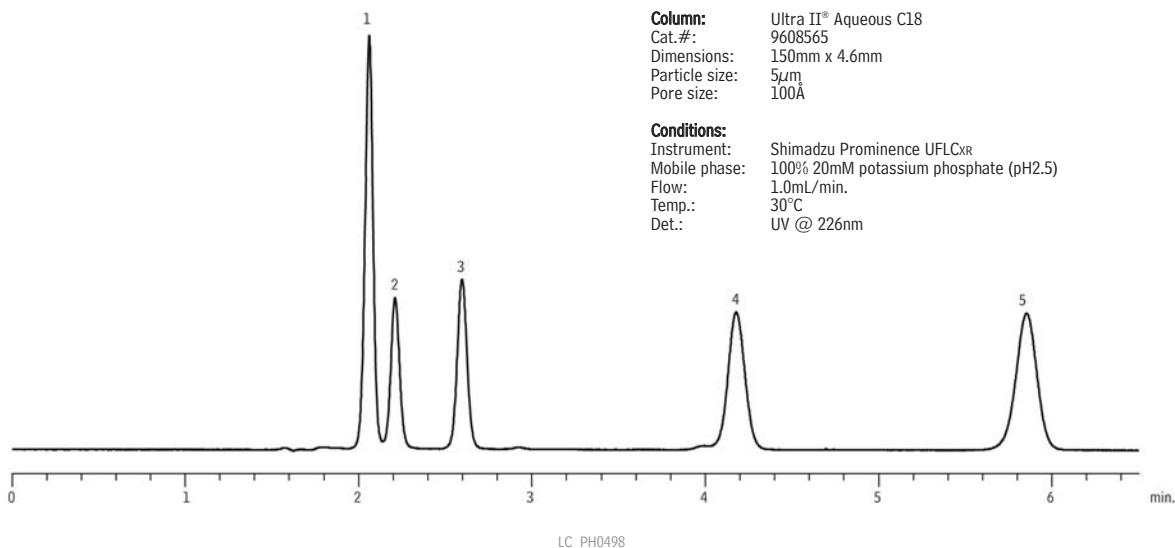
NEW!

Peak List	Ret. Time (min.)
1. tartaric acid	2.061
2. quinic acid	2.210
3. malic acid	2.596
4. citric acid	4.177
5. fumaric acid	5.853

Sample:
Inj.: 5µL
Conc.: 10µg/mL fumaric acid,
2,000µg/mL each other acids
Sample diluent: water

Column: Ultra II® Aqueous C18
Cat.#: 9608565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCxr
Mobile phase: 100% 20mM potassium phosphate (pH2.5)
Flow: 1.0mL/min.
Temp.: 30°C
Det.: UV @ 226nm


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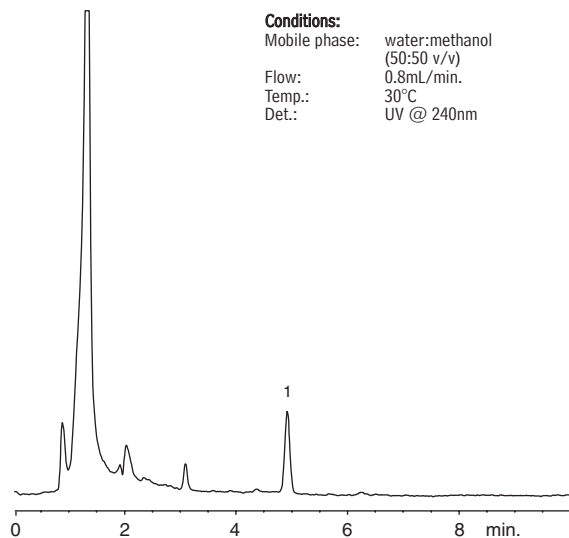
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www.restek.com **729**

Allicin in Garlic Tablets on Pinnacle® II C18

Peak List:
1. allicin

Sample:
Inj.: 20µL
Conc.: 1.2mg/mL
garlic tablet in water
deionized water
Solvent:
Column: Pinnacle® II C18
Cat. #: 9214565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 110Å
Conditions:
Mobile phase: water:methanol
(50:50 v/v)
Flow: 0.8mL/min.
Temp.: 30°C
Det.: UV @ 240nm



LC_0174

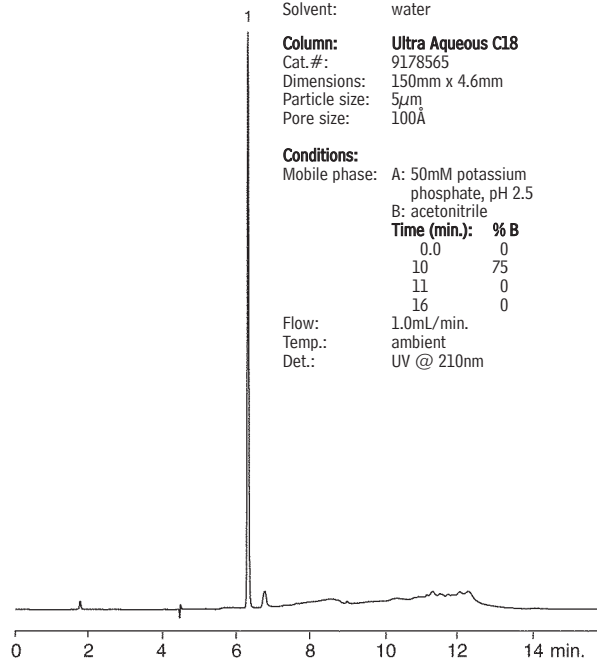
Phenethyl Glucosinolate on Ultra Aqueous C18

Peak List:
1. phenethyl glucosinolate

Sample:
Inj.: 10µL
Conc.: 1,000µg/mL
Solvent: water
Column: Ultra Aqueous C18
Cat. #: 9178565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å
Conditions:
Mobile phase: A: 50mM potassium
phosphate, pH 2.5
B: acetonitrile

Time (min.)	% B
0.0	0
10	75
11	0
16	0

Flow: 1.0mL/min.
Temp.: ambient
Det.: UV @ 210nm



LC_0166

Phenolics in Echinacea on Pinnacle® II C18

Sample:
Inj.: 10µL
Conc.: 6.7mg/mL Echinacea capsule
contents in sample diluent
ethanol:water (70:30, v/v)
Sample temp.: 25°C

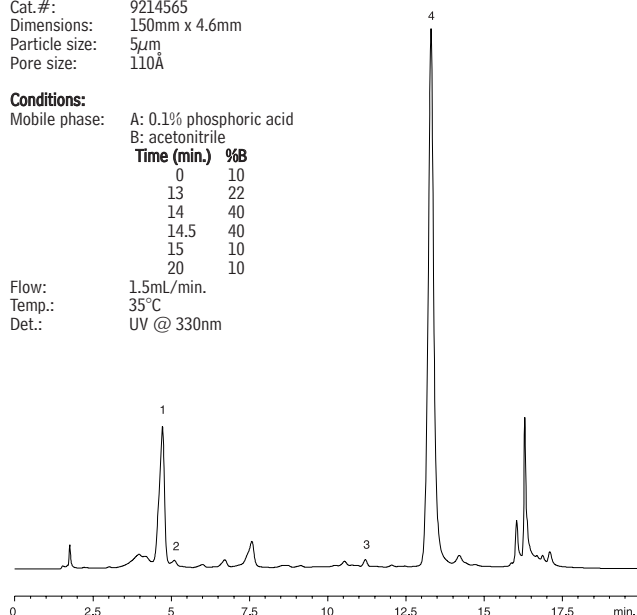
Peak List:
1. caftaric acid
2. chlorogenic acid
3. echinacoside
4. cichoric acid

Column: Pinnacle® II C18
Cat. #: 9214565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 110Å

Conditions:
Mobile phase: A: 0.1% phosphoric acid
B: acetonitrile

Time (min.)	%B
0	10
13	22
14	40
14.5	40
15	10
20	10

Flow: 1.5mL/min.
Temp.: 35°C
Det.: UV @ 330nm



LC_0195

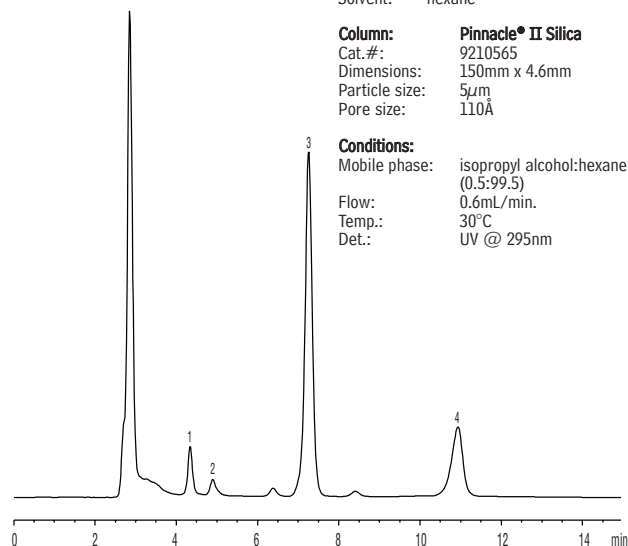
Tocopherols in Soy Oil on Pinnacle® II Silica

Peak List:
1. α-tocopherol
2. β-tocopherol
3. γ-tocopherol
4. δ-tocopherol

Sample:
Inj.: 10µL
Conc.: approx. 1.25% soy oil
Solvent: hexane

Column: Pinnacle® II Silica
Cat. #: 9210565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 110Å

Conditions:
Mobile phase: isopropyl alcohol:hexane
(0.5:99.5)
Flow: 0.6mL/min.
Temp.: 30°C
Det.: UV @ 295nm



LC_0197

Vitamin D on Ultra Aqueous C18 (LC/MS/MS)

NEW!

Sample:
Inj.: 20µL
Conc.: extracted serum sample

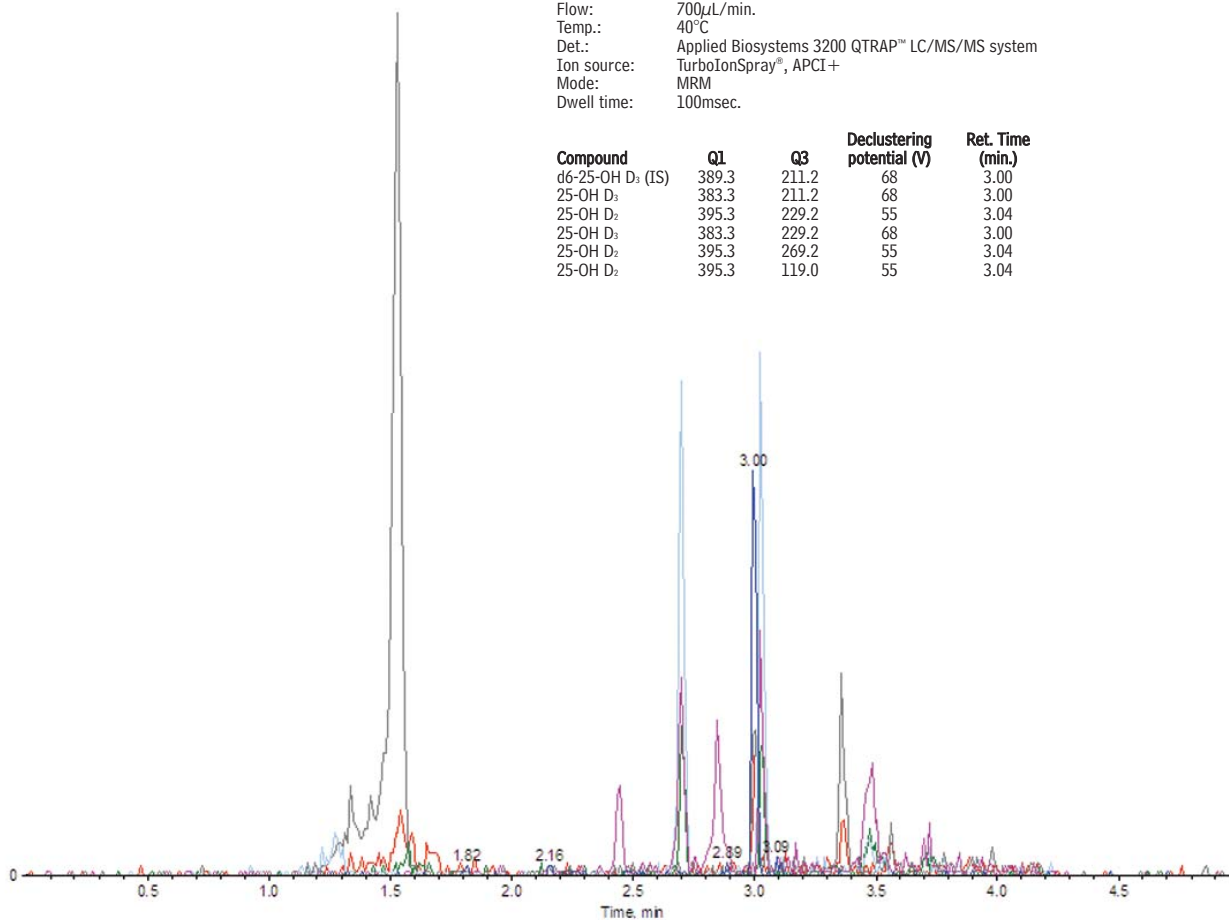
Column: Ultra Aqueous C18
Cat.#: 9178352
Dimensions: 50mm x 2.1mm
Particle size: 3µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence® UFLCxr
Mobile phase: A: 0.1% formic acid in water
B: 0.1% formic acid in methanol

Time (min.)	%B
0.00	50
2.5	100
3.5	100
3.6	50
5.00	50

Flow: 700µL/min.
Temp.: 40°C
Det.: Applied Biosystems 3200 QTRAP™ LC/MS/MS system
Ion source: TurboIonSpray®, APCI+
Mode: MRM
Dwell time: 100msec.

Compound	Q1	Q3	Decustering potential (V)	Ret. Time (min.)
d6-25-OH D ₃ (IS)	389.3	211.2	68	3.00
25-OH D ₃	383.3	211.2	68	3.00
25-OH D ₂	395.3	229.2	55	3.04
25-OH D ₃	383.3	229.2	68	3.00
25-OH D ₂	395.3	269.2	55	3.04
25-OH D ₂	395.3	119.0	55	3.04



LC_CF0492

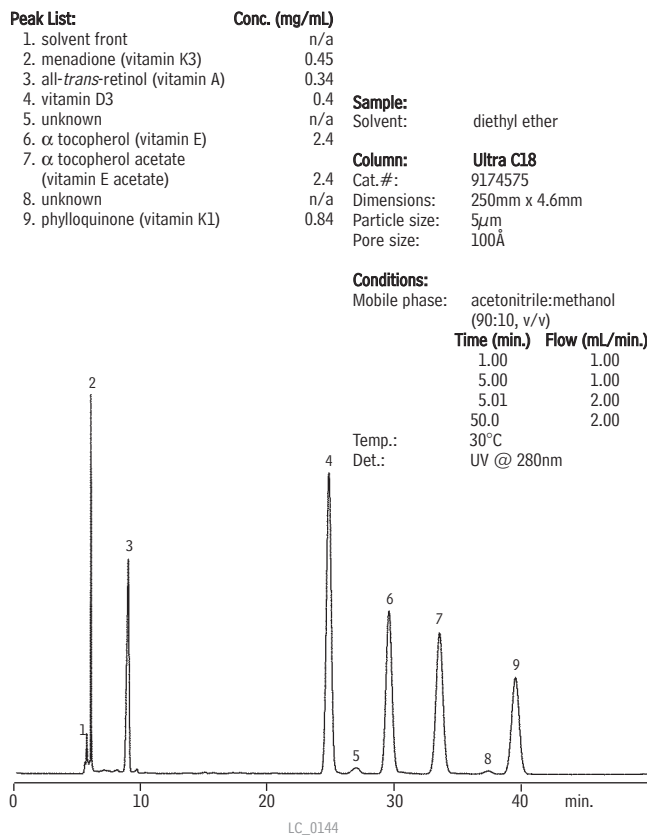

for **more** info

Visit **www.restek.com/cat003** to view our "5 Minute Analysis of Vitamin D in Serum by LC/MS/MS" article.

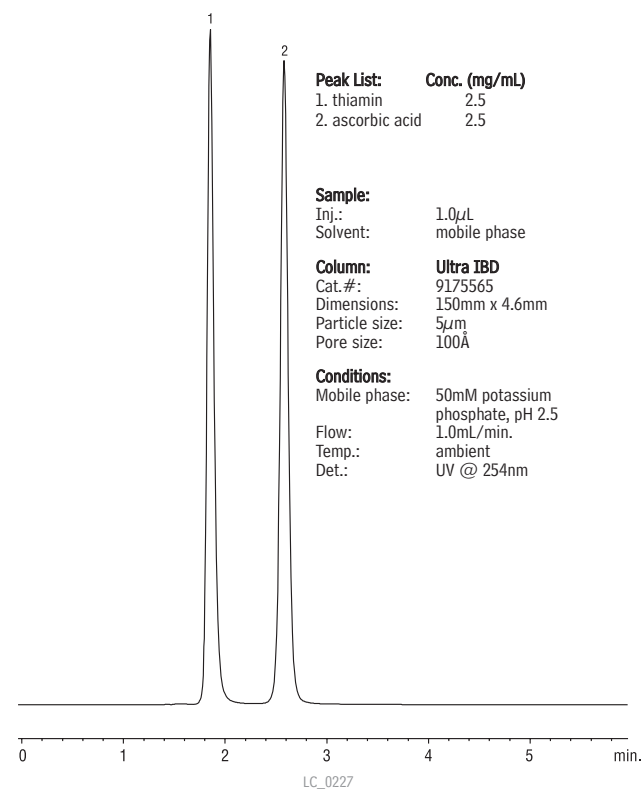
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Vitamins Thiamin (Vitamin B1) and Ascorbic Acid (Vitamin C) on Ultra IBD



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Fat Soluble Vitamins Ultra II® C18

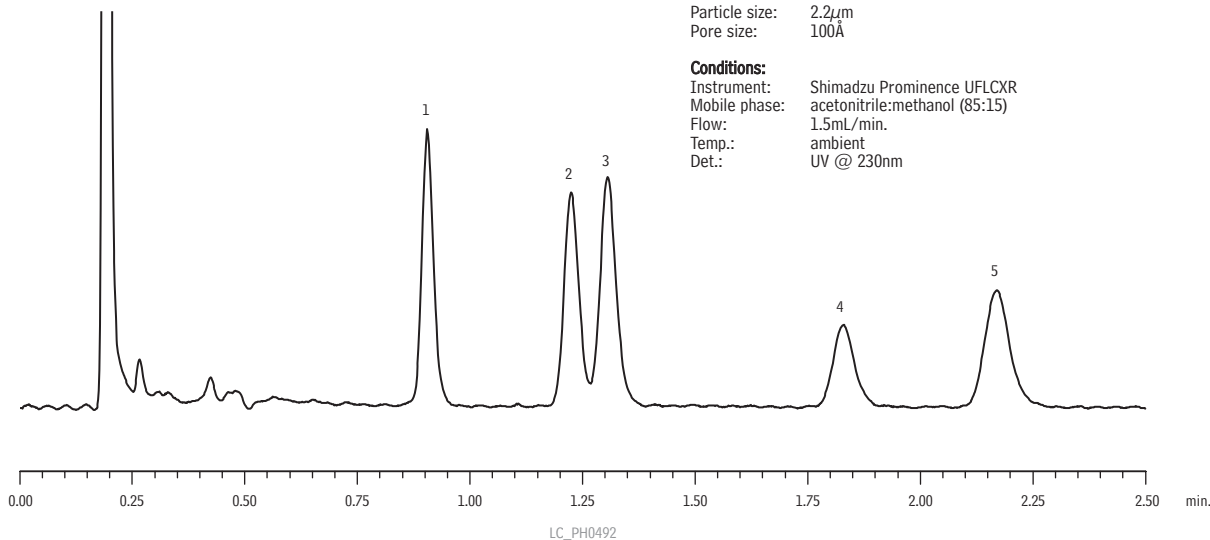
NEW!

Peak List	Ret. Time (min.)
1. vitamin K2	0.905
2. vitamin D2	1.224
3. vitamin D3	1.305
4. vitamin E acetate	1.828
5. vitamin K1	2.169

Sample:
Inj.: 1µL
Conc.: 100µg/mL each component
Sample diluent: acetone

Column: Ultra II® C18
Cat. #: 9604853
Dimensions: 50mm x 3.0mm
Particle size: 2.2µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCXR
Mobile phase: acetonitrile:methanol (85:15)
Flow: 1.5mL/min.
Temp.: ambient
Det.: UV @ 230nm



Vitamins B1, B2, B3, and B6 Ultra C8

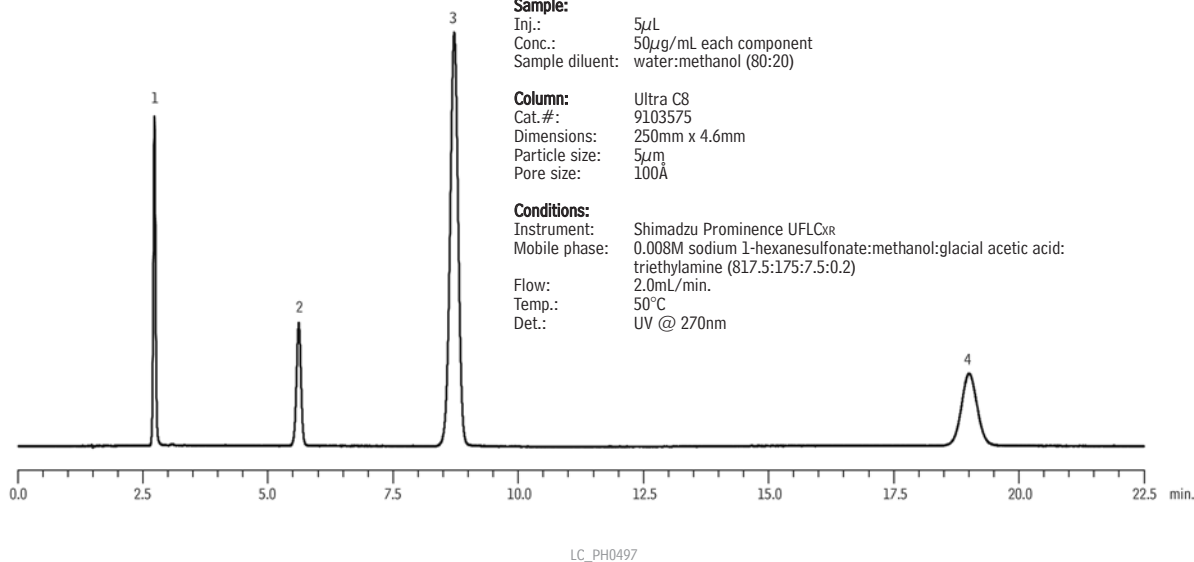
NEW!

Peak List	Ret. Time (min.)
1. vitamin B ₃ (nicotinamide)	2.732
2. vitamin B ₆ (pyridoxine)	5.615
3. vitamin B ₂ (riboflavin)	8.719
4. vitamin B ₁ (thiamine)	19.004

Sample:
Inj.: 5µL
Conc.: 50µg/mL each component
Sample diluent: water:methanol (80:20)

Column: Ultra C8
Cat. #: 9103575
Dimensions: 250mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCXR
Mobile phase: 0.008M sodium 1-hexanesulfonate:methanol:glacial acetic acid: triethylamine (817.5:175:7.5:0.2)
Flow: 2.0mL/min.
Temp.: 50°C
Det.: UV @ 270nm



Water Soluble B Vitamins

Ultra II® Aqueous C18

NEW!

Sample:

Inj.: 1µL
Conc.: 100µg/mL each component
Sample diluent: water:methanol (70:30)

Column:

Ultra II® Aqueous C18
Cat.#: 9608565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

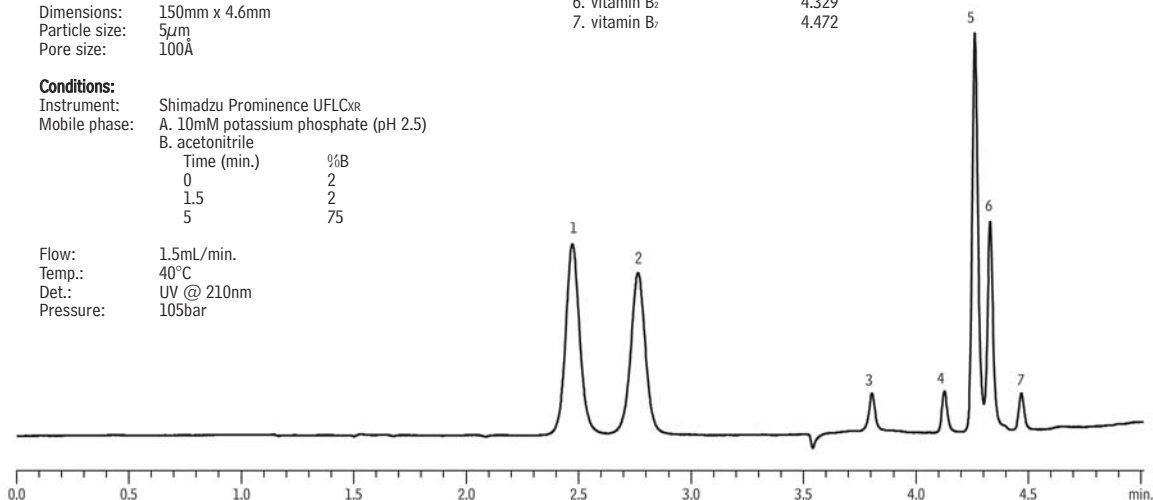
Instrument: Shimadzu Prominence UFLCxx
Mobile phase: A. 10mM potassium phosphate (pH 2.5)
B. acetonitrile
Time (min.) %B
0 2
1.5 2
5 75

Flow: 1.5mL/min.
Temp.: 40°C
Det.: UV @ 210nm
Pressure: 105bar

Peak List

Ret. Time (min.)

1. vitamin B ₃	2.472
2. vitamin B ₆	2.764
3. vitamin B ₅	3.804
4. vitamin B ₉	4.126
5. vitamin B ₁₂	4.261
6. vitamin B ₂	4.329
7. vitamin B ₇	4.472



LC_PH0503

Vitamin C

Ultra II® Aqueous C18

NEW!

Peak List	Ret. Time (min.)
1. ascorbic acid (vitamin C)	1.759

Sample:

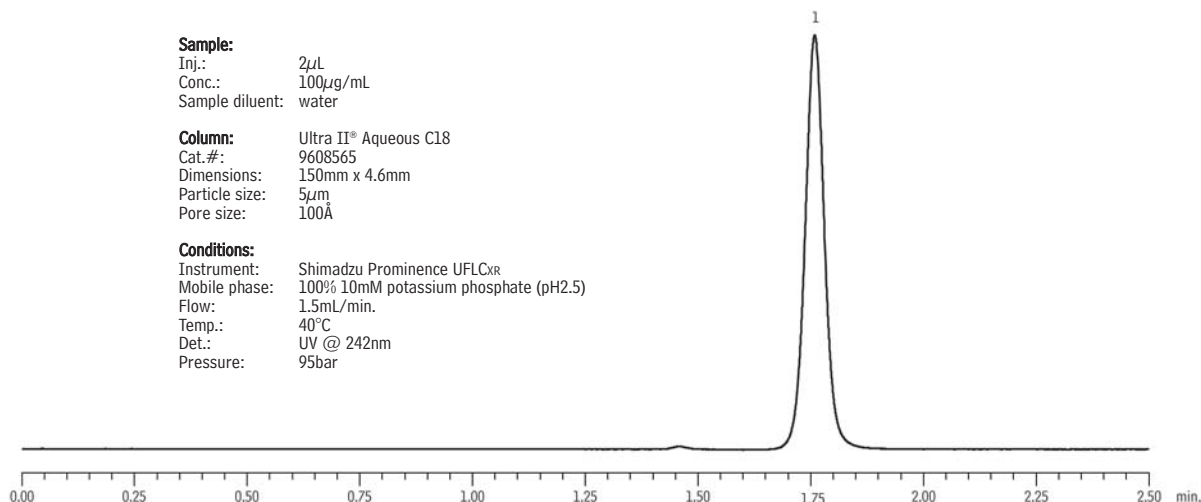
Inj.: 2µL
Conc.: 100µg/mL
Sample diluent: water

Column:

Ultra II® Aqueous C18
Cat.#: 9608565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

Instrument: Shimadzu Prominence UFLCxx
Mobile phase: 100% 10mM potassium phosphate (pH2.5)
Flow: 1.5mL/min.
Temp.: 40°C
Det.: UV @ 242nm
Pressure: 95bar

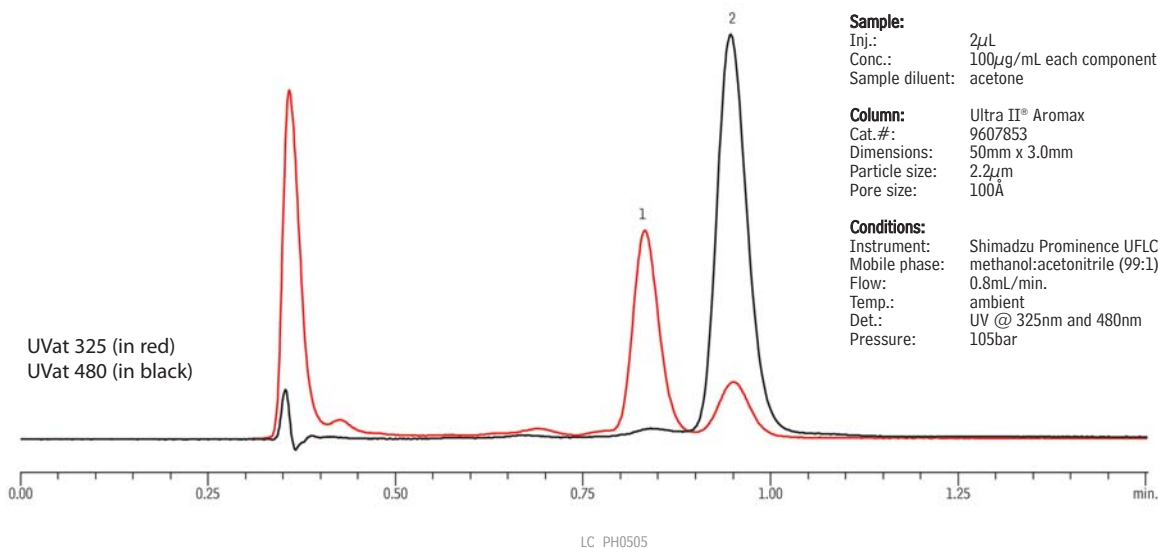


LC_PH0504

Vitamin A Compounds
Ultra II® Aromax

NEW!

Peak List	Ret. Time (min.)
1. retinol	0.832
2. β -carotene	0.950



Sample:
Inj.: 2 μ L
Conc.: 100 μ g/mL each component
Sample diluent: acetone

Column: Ultra II® Aromax
Cat.#: 9607853
Dimensions: 50mm x 3.0mm
Particle size: 2.2 μ m
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCXR
Mobile phase: methanol:acetonitrile (99:1)
Flow: 0.8mL/min.
Temp.: ambient
Det.: UV @ 325nm and 480nm
Pressure: 105bar

Chromatogram Search Tool

Search by compound name, synonym,
CAS # or keyword

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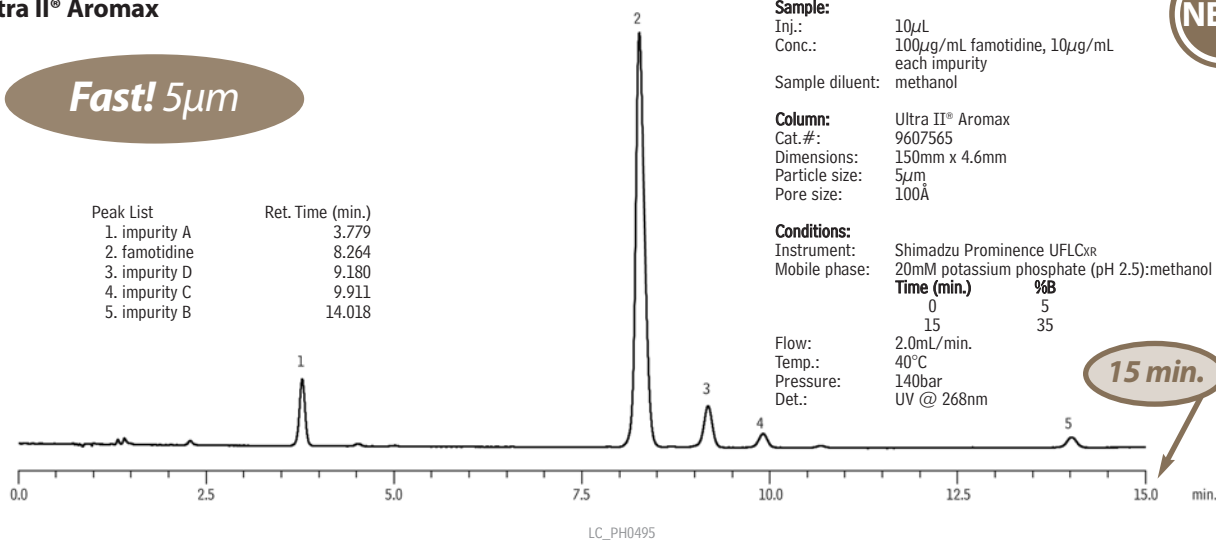
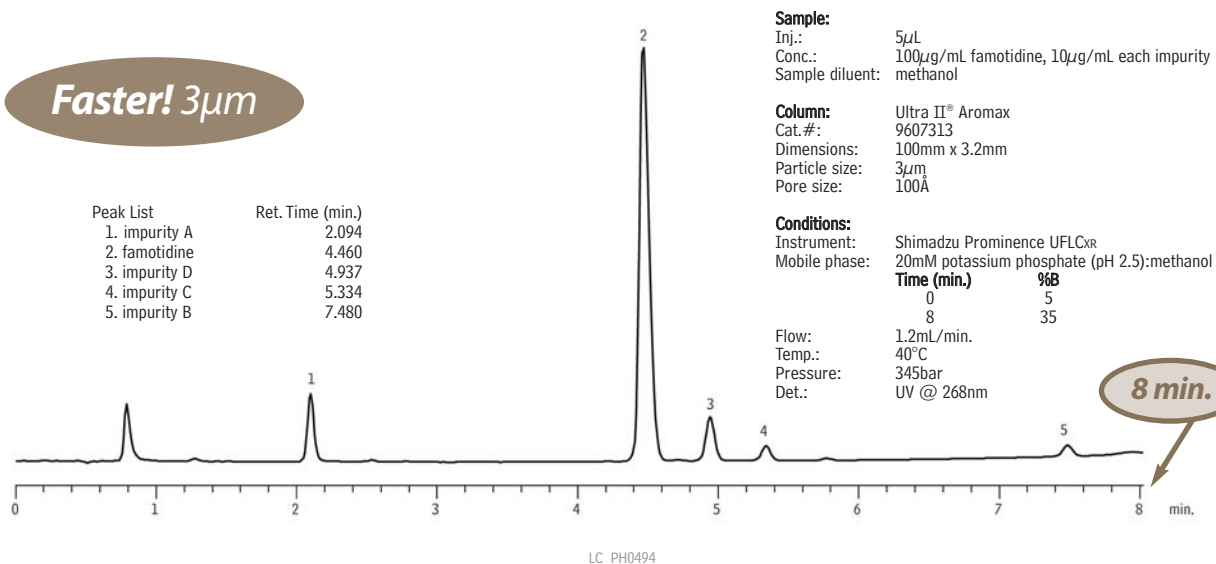
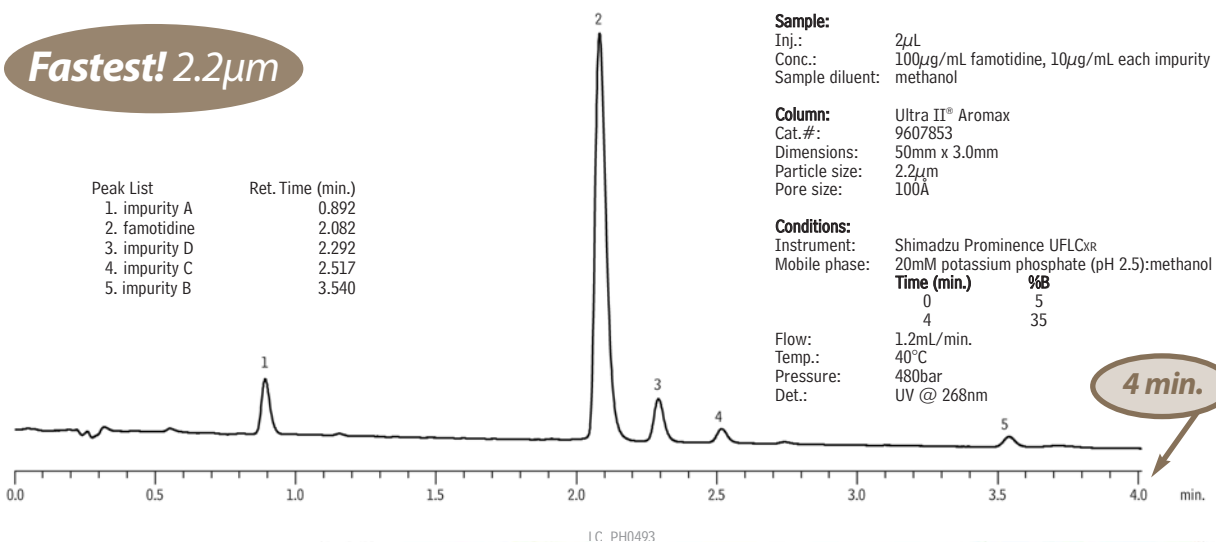


Famotidine

Famotidine and USP Impurities

Ultra II® Aromax

NEW!

Fast! 5µm**Faster! 3µm****Fastest! 2.2µm**

Potential Genotoxic Impurities
Ultra II® Aromax



Peak List	M/Z*
1. ethyl benzenesulfonate	204
2. isopropyl toluenesulfonate	232
3. <i>n</i> -propyl toluenesulfonate	232
4. <i>n</i> -butyl toluenesulfonate	246

*All M/Z are [M+NH₄]⁺

Sample:

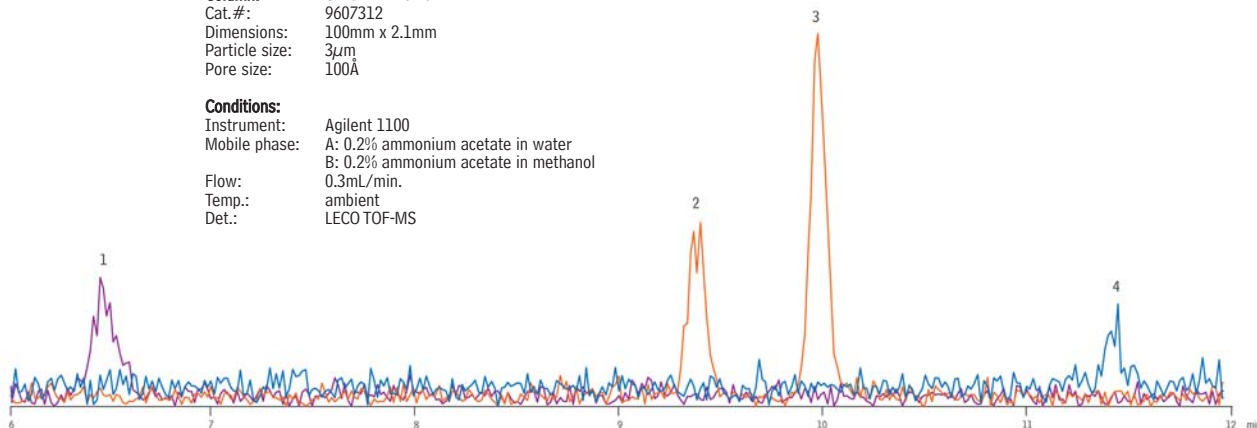
Inj.: 100 µL
Conc.: 10 ng/mL each PGI in 1 mg/mL dorzolamide
Sample diluent: mobile phase

Column:

Ultra II® Aromax
Cat.#: 9607312
Dimensions: 100 mm x 2.1 mm
Particle size: 3 µm
Pore size: 100 Å

Conditions:

Instrument: Agilent 1100
Mobile phase: A: 0.2% ammonium acetate in water
B: 0.2% ammonium acetate in methanol
Flow: 0.3 mL/min.
Temp.: ambient
Det.: LECO TOF-MS



LC_PH0482B

Hydroxybenzoic Acids on Ultra Aqueous C18

1. 3,5-dihydroxybenzoic acid
2. 2,5-dihydroxybenzoic acid
3. 4-hydroxybenzoic acid
4. 3-hydroxybenzoic acid
5. 2,4-dihydroxybenzoic acid
6. benzoic acid
7. salicylic acid

Sample:

Inj.: 5 µL
Conc.: 50 µg/mL each component
Sample diluent: mobile phase

Column:

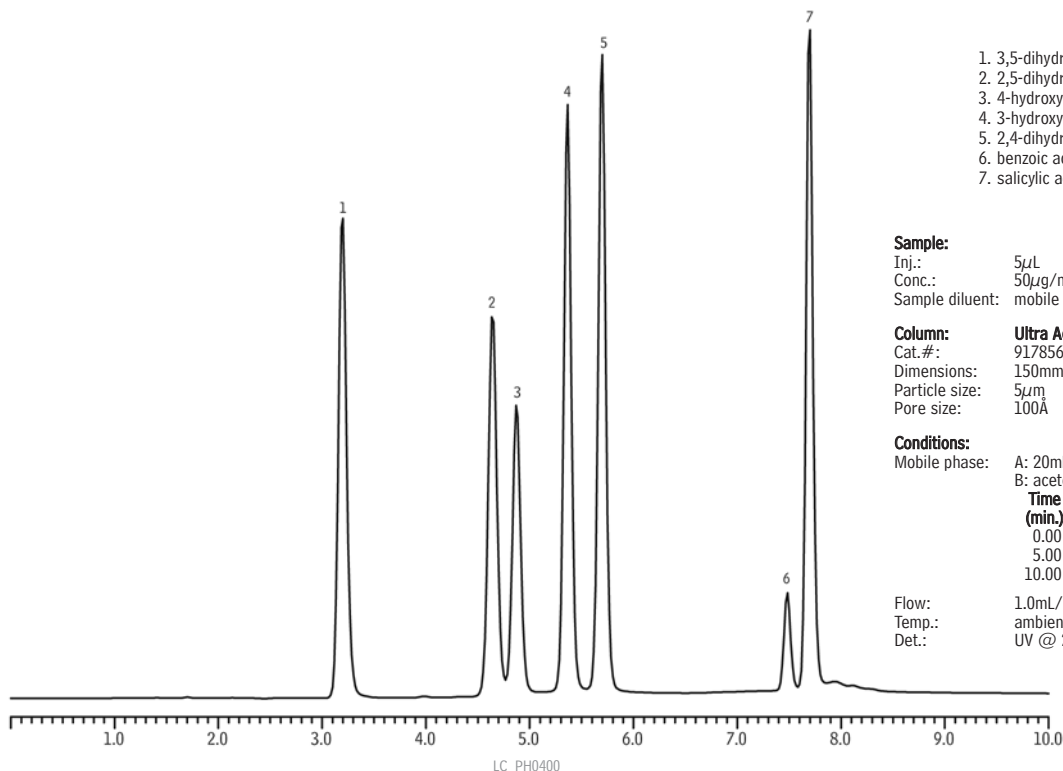
Ultra Aqueous C18
Cat.#: 9178565
Dimensions: 150 mm x 4.6 mm
Particle size: 5 µm
Pore size: 100 Å

Conditions:

Mobile phase: A: 20 mM potassium phosphate (pH 2.5);
B: acetonitrile

Time (min.)	%B
0.00	20
5.00	50
10.00	50

Flow: 1.0 mL/min.
Temp.: ambient
Det.: UV @ 210 nm



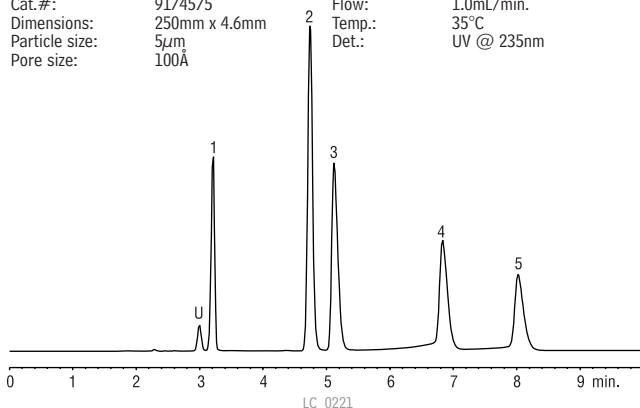
Analgesic Acetaminophen and Narcotic Analgesics on Ultra C18

Peak List:	Conc. (µg/mL)
U. unknown	unknown
1. morphine sulfate	204
2. acetaminophen	92
3. codeine phosphate	216
4. oxycodone HCl	206
5. hydrocodone bitartrate	218

Sample:
Inj.: 4.0 µL
Sample: raw material mix
Solvent: mobile phase

Column: **Ultra C18**
Cat.#: 9174575
Dimensions: 250mm x 4.6mm
Particle size: 5 µm
Pore size: 100 Å

Conditions:
Mobile phase: A: 10mm potassium phosphate, pH 2.8
B: acetonitrile:methanol, (90:10, v/v) (85A:15B, v/v)
Flow: 1.0 mL/min.
Temp.: 35°C
Det.: UV @ 235nm



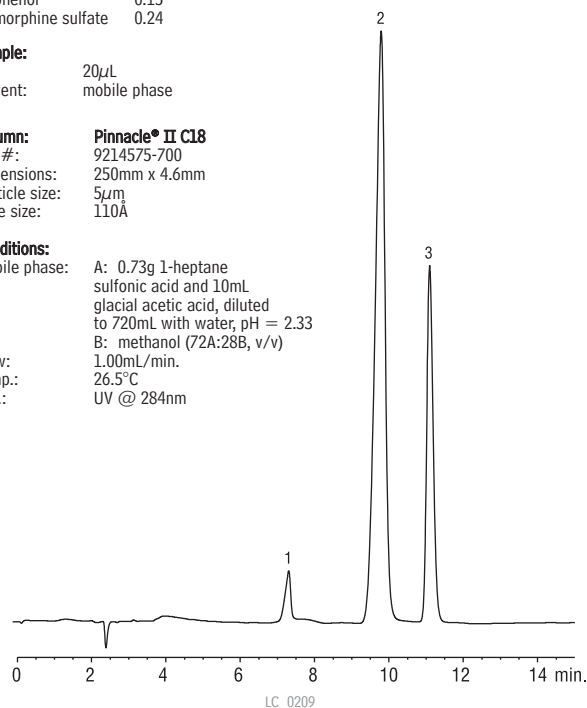
Narcotic Analgesic Morphine Sulfate Raw Material - USP 25: Resolution Solution on Pinnacle® II C18

Peak List:	Conc. (µg/mL)
1. unknown	unknown
2. phenol	0.15
3. morphine sulfate	0.24

Sample:
Inj.: 20 µL
Solvent: mobile phase

Column: **Pinnacle® II C18**
Cat.#: 9214575-700
Dimensions: 250mm x 4.6mm
Particle size: 5 µm
Pore size: 110 Å

Conditions:
Mobile phase: A: 0.73g 1-heptane sulfonic acid and 10mL glacial acetic acid, diluted to 720mL with water, pH = 2.33
B: methanol (72A:28B, v/v)
Flow: 1.00 mL/min.
Temp.: 26.5°C
Det.: UV @ 284nm



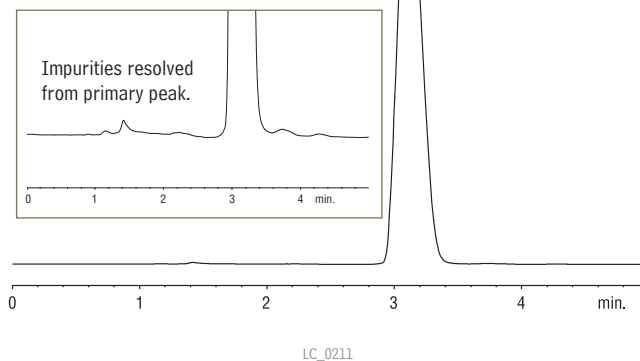
Narcotic Analgesic Hydrocodone Bitartrate by USP 25 on Pinnacle® II Silica

Peak List:	Ret. Time (min.)	Inj. % RSD (n = 5)
1. hydrocodone bitartrate	3.1	0.37%

Sample:
Inj.: 20 µL
Conc.: 1 µg/mL
Sample: assay standard
Solvent: mobile phase

Column: **Pinnacle® II Silica**
Cat.#: 9210575
Dimensions: 250mm x 4.6mm
Particle size: 5 µm
Pore size: 110 Å

Conditions:
Mobile phase: A: 800mL acetonitrile; 4mL water; 1mL diethylamine
B: methanol (55A:45B, v/v)
Flow: 1.5 mL/min.
Temp.: 27°C
Det.: UV @ 280nm



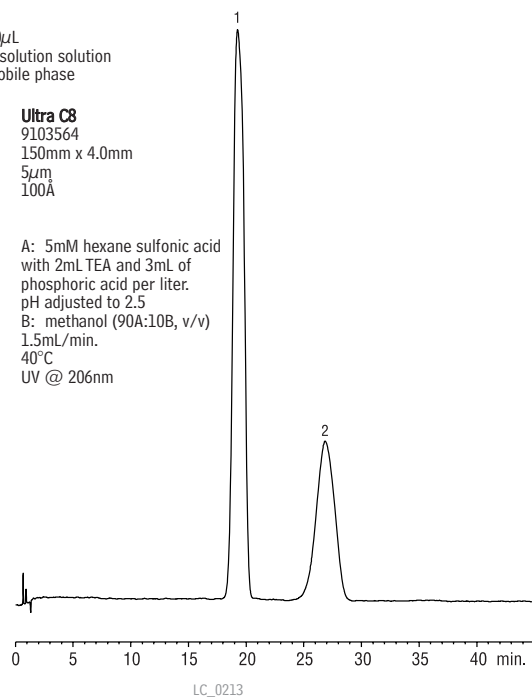
Narcotic Analgesic Oxycodone HCl Raw Material by USP 25: Resolution Solution on Ultra C8

Peak List:	Conc. (µg/mL)	Ret. Time (min.)	RRT	Tailing	Res.
1. codeine phosphate	13	19.3	0.7	1.1	—
2. oxycodone HCl	9	26.8	1.0	0.99	3.3

Sample:
Inj.: 10 µL
Sample: resolution solution
Solvent: mobile phase

Column: **Ultra C8**
Cat.#: 9103564
Dimensions: 150mm x 4.0mm
Particle size: 5 µm
Pore size: 100 Å

Conditions:
Mobile phase: A: 5mM hexane sulfonic acid with 2mL TEA and 3mL of phosphoric acid per liter. pH adjusted to 2.5
B: methanol (90A:10B, v/v)
Flow: 1.5 mL/min.
Temp.: 40°C
Det.: UV @ 206nm



Antiarrhythmic Calcium Channel Blockers on Ultra Cyano

Peak List:

1. diltiazem
2. nifedipine impurity
3. verapamil
4. nifedipine
5. nicardipine

Sample:

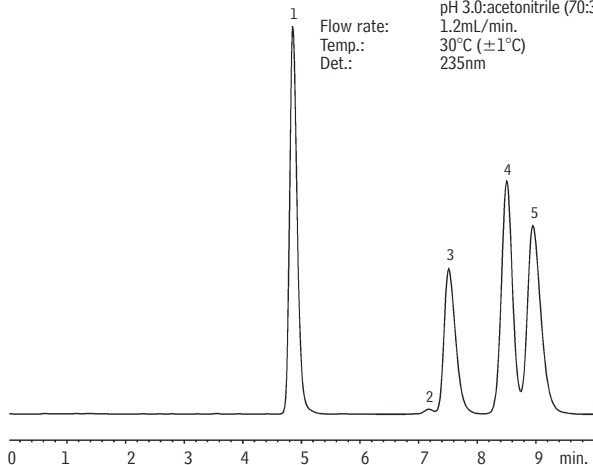
Inj.: 5µL
Conc.: 100mg/mL
Solvent: acetonitrile:water (1:1)

Column:

Ultra Cyano
Cat. #: 9106565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

Mobile phase: 20mM potassium phosphate monobasic, pH 3.0:acetonitrile (70:30, v/v)
Flow rate: 1.2mL/min.
Temp.: 30°C (±1°C)
Det.: 235nm



LC_0062

Antiarrhythmic Furosemide on Ultra IBD

Peak List:

1. uracil (marker)
2. furosemide

Sample:

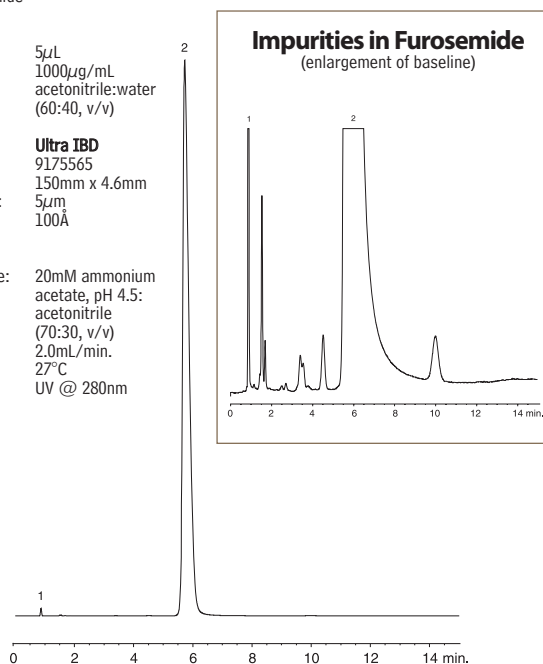
Inj.: 5µL
Conc.: 1000µg/mL
Solvent: acetonitrile:water (60:40, v/v)

Column:

Ultra IBD
Cat. #: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

Mobile phase: 20mM ammonium acetate, pH 4.5: acetonitrile (70:30, v/v)
Flow rate: 2.0mL/min.
Temp.: 27°C
Det.: UV @ 280nm



LC_0071

Antiasthmatic Beclomethasone on Ultra C18

Peak List:

1. beclomethasone
2. deschlorobeclo methasone

Sample:

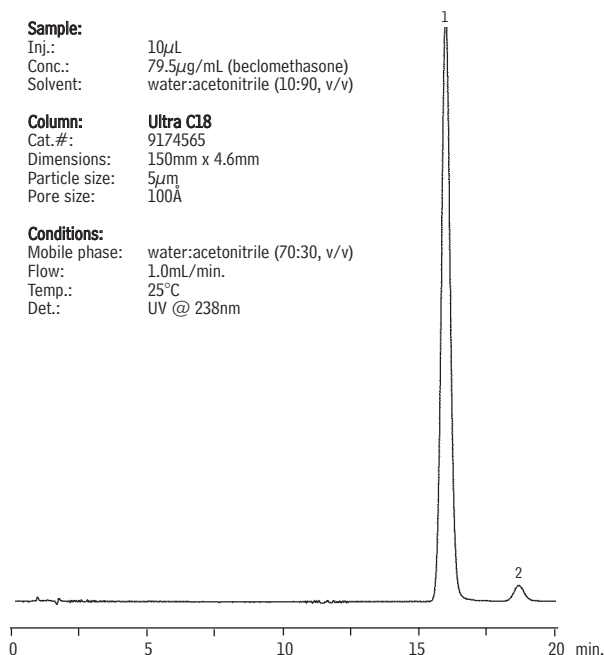
Inj.: 10µL
Conc.: 79.5µg/mL (beclomethasone)
Solvent: water:acetonitrile (10:90, v/v)

Column:

Ultra C18
Cat. #: 9174565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

Mobile phase: water:acetonitrile (70:30, v/v)
Flow: 1.0mL/min.
Temp.: 25°C
Det.: UV @ 238nm



LC_0120

Chromatogram Search Tool

Search by compound name, synonym,
CAS # or keyword

www.restek.com/chromatograms



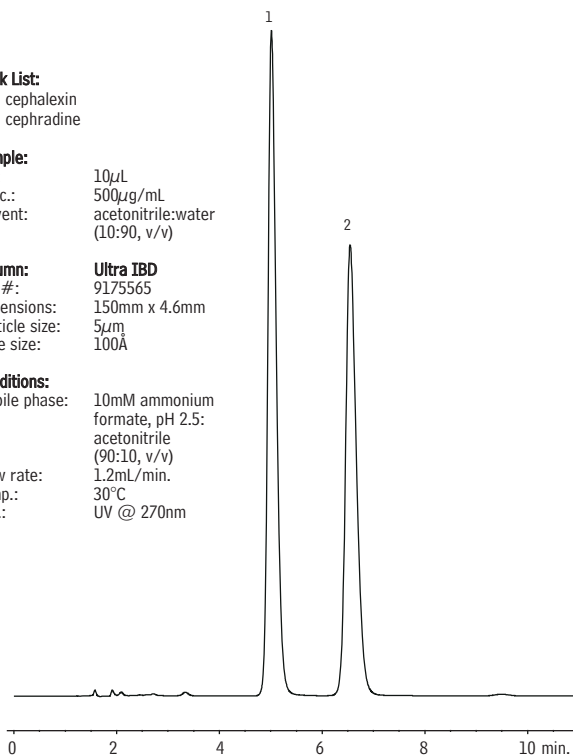
Antibiotic Cephalixin on Ultra IBD

Peak List:
1. cephalixin
2. cephradine

Sample:
Inj.: 10 μ L
Conc.: 500 μ g/mL
Solvent: acetonitrile:water
(10:90, v/v)

Column: Ultra IBD
Cat. #: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5 μ m
Pore size: 100Å

Conditions:
Mobile phase: 10mM ammonium
formate, pH 2.5:
acetonitrile
(90:10, v/v)
Flow rate: 1.2mL/min.
Temp.: 30°C
Det.: UV @ 270nm



LC_0094

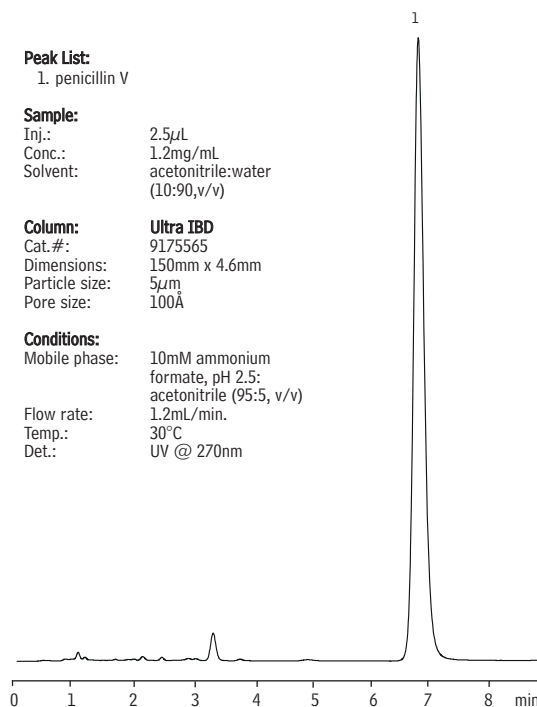
Antibiotic Penicillin V on Ultra IBD

Peak List:
1. penicillin V

Sample:
Inj.: 2.5 μ L
Conc.: 1.2mg/mL
Solvent: acetonitrile:water
(10:90, v/v)

Column: Ultra IBD
Cat. #: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5 μ m
Pore size: 100Å

Conditions:
Mobile phase: 10mM ammonium
formate, pH 2.5:
acetonitrile (95:5, v/v)
1.2mL/min.
Temp.: 30°C
Det.: UV @ 270nm



LC_0096

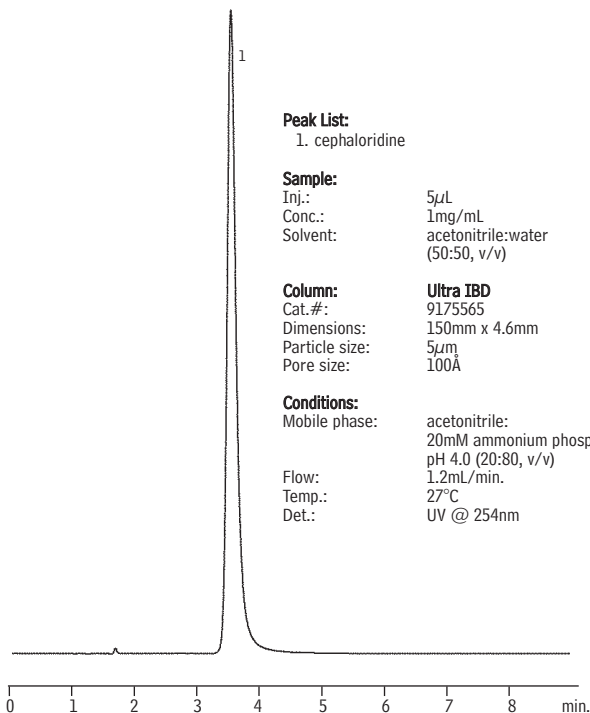
Antibiotic Cephaloridine on Ultra IBD (Reversed Phase)

Peak List:
1. cephaloridine

Sample:
Inj.: 5 μ L
Conc.: 1mg/mL
Solvent: acetonitrile:water
(50:50, v/v)

Column: Ultra IBD
Cat. #: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5 μ m
Pore size: 100Å

Conditions:
Mobile phase: acetonitrile:
20mM ammonium phosphate,
pH 4.0 (20:80, v/v)
1.2mL/min.
Temp.: 27°C
Det.: UV @ 254nm



LC_0102

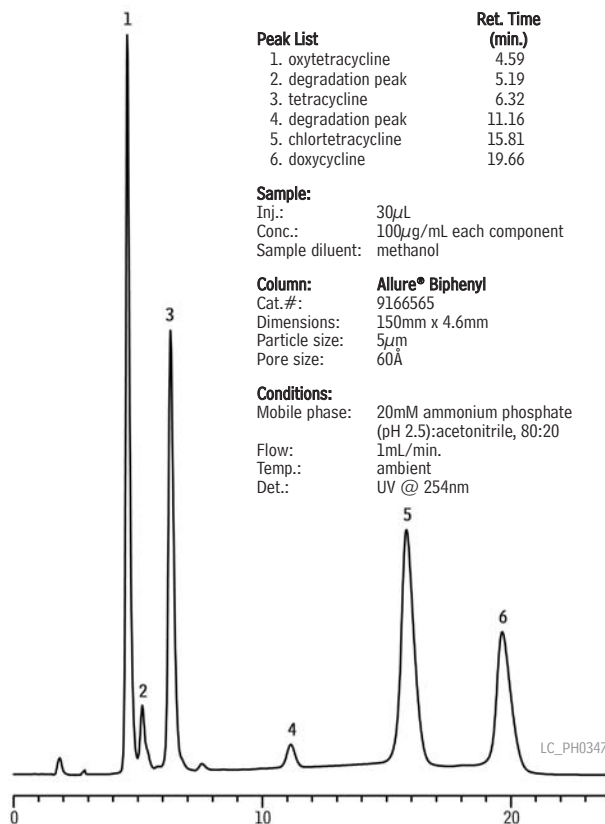
Tetracycline Mix on Allure® Biphenyl

Peak List	Ret. Time (min.)
1. oxytetracycline	4.59
2. degradation peak	5.19
3. tetracycline	6.32
4. degradation peak	11.16
5. chlortetracycline	15.81
6. doxycycline	19.66

Sample:
Inj.: 30 μ L
Conc.: 100 μ g/mL each component
Sample diluent: methanol

Column: Allure® Biphenyl
Cat. #: 9166565
Dimensions: 150mm x 4.6mm
Particle size: 5 μ m
Pore size: 60Å

Conditions:
Mobile phase: 20mM ammonium phosphate
(pH 2.5):acetonitrile, 80:20
Flow: 1mL/min.
Temp.: ambient
Det.: UV @ 254nm



LC_PH0347

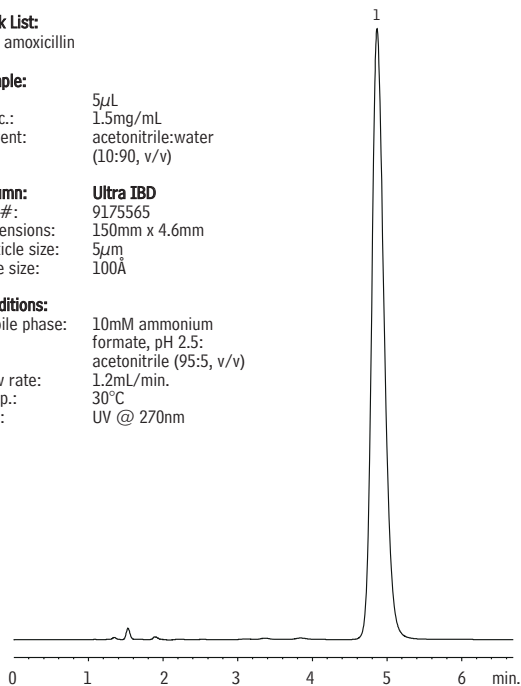
Antibiotic Amoxicillin on Ultra IBD

Peak List:
1. amoxicillin

Sample:
Inj.: 5µL
Conc.: 1.5mg/mL
Solvent: acetonitrile:water
(10:90, v/v)

Column: **Ultra IBD**
Cat.#: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: 10mM ammonium
formate, pH 2.5:
acetonitrile (95:5, v/v)
Flow rate: 1.2mL/min.
Temp.: 30°C
Det.: UV @ 270nm



LC_0095

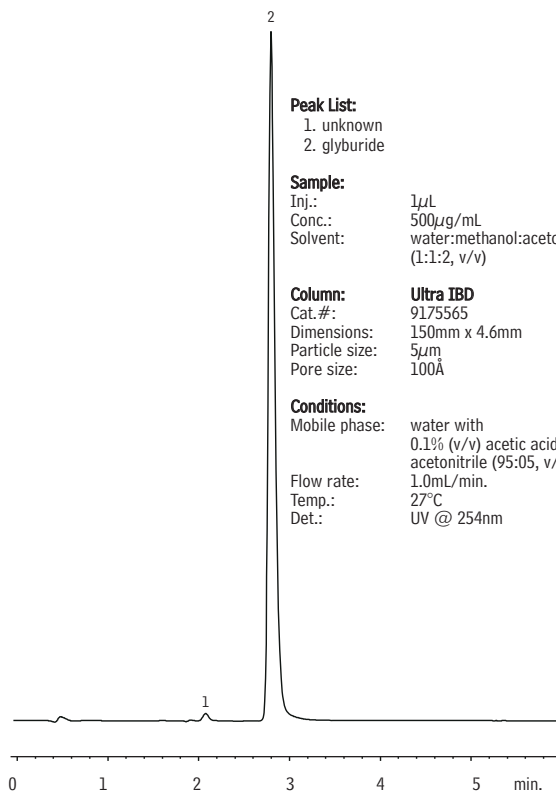
Anti-Diabetic Glyburide (Glybenclamide) on Ultra IBD

Peak List:
1. unknown
2. glyburide

Sample:
Inj.: 1µL
Conc.: 500µg/mL
Solvent: water:methanol:acetonitrile
(1:1:2, v/v)

Column: **Ultra IBD**
Cat.#: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: water with
0.1% (v/v) acetic acid:
acetonitrile (95:05, v/v)
Flow rate: 1.0mL/min.
Temp.: 27°C
Det.: UV @ 254nm



LC_0069

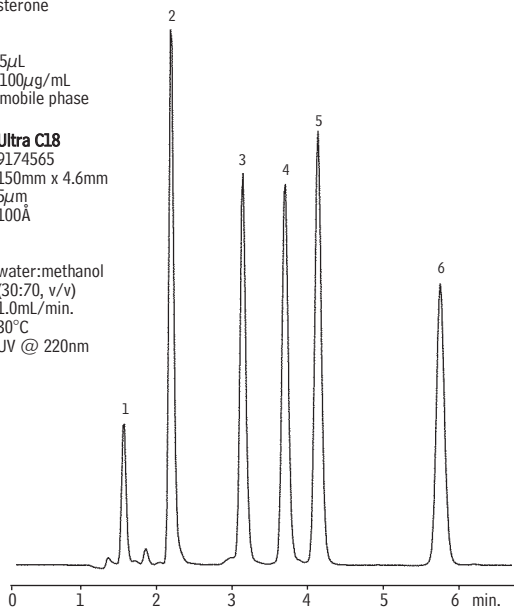
Corticosteroids on Ultra C18

Peak List:
1. uracil (void marker)
2. triamcinolone
3. hydrocortisone
4. dexamethasone
5. corticosterone
6. deoxycorticosterone

Sample:
Inj.: 5µL
Conc.: 100µg/mL
Solvent: mobile phase

Column: **Ultra C18**
Cat.#: 9174565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: water:methanol
(30:70, v/v)
Flow: 1.0mL/min.
Temp.: 30°C
Det.: UV @ 220nm



LC_0108

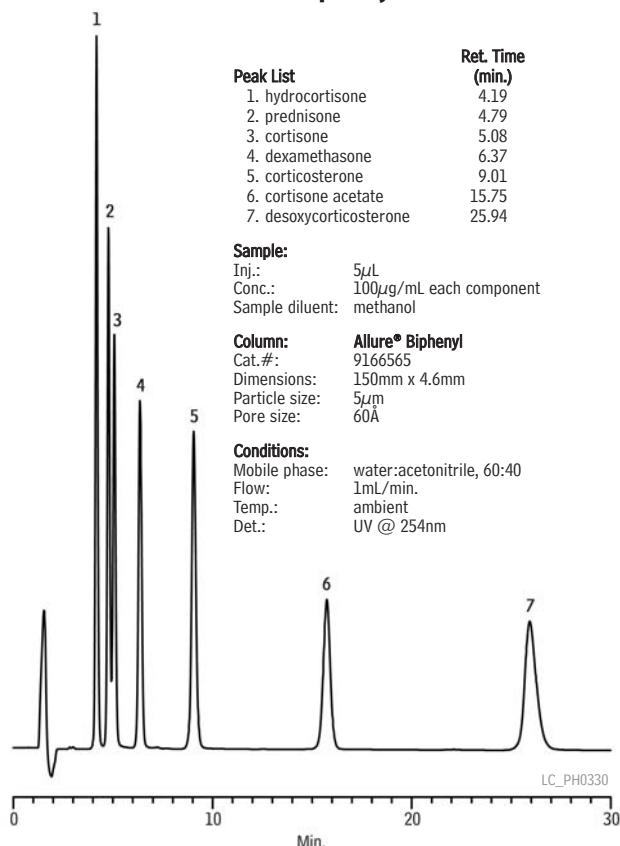
Corticosteroids on Allure® Biphenyl

Peak List	Ret. Time (min.)
1. hydrocortisone	4.19
2. prednisone	4.79
3. cortisone	5.08
4. dexamethasone	6.37
5. corticosterone	9.01
6. cortisone acetate	15.75
7. desoxycorticosterone	25.94

Sample:
Inj.: 5µL
Conc.: 100µg/mL each component
Sample diluent: methanol

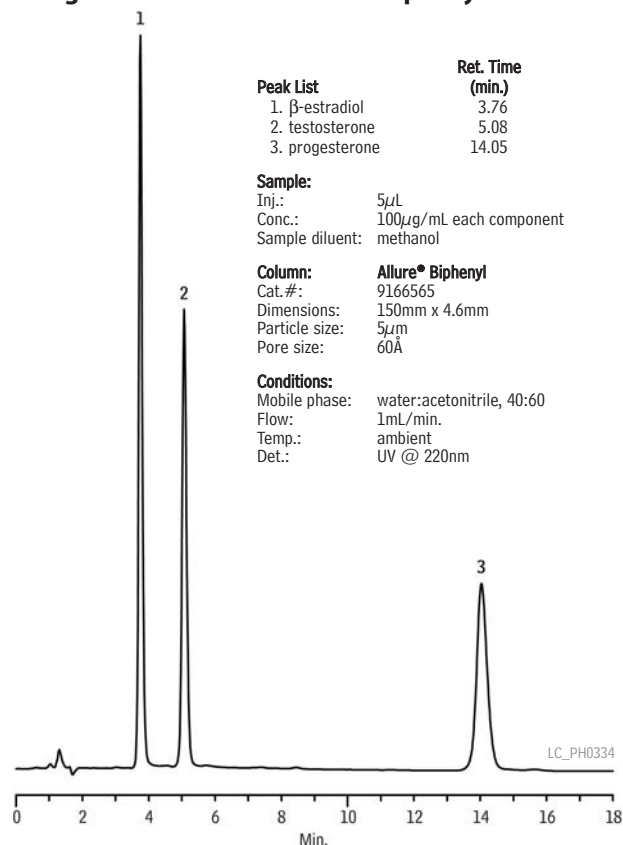
Column: **Allure® Biphenyl**
Cat.#: 9166565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 60Å

Conditions:
Mobile phase: water:acetonitrile, 60:40
Flow: 1mL/min.
Temp.: ambient
Det.: UV @ 254nm

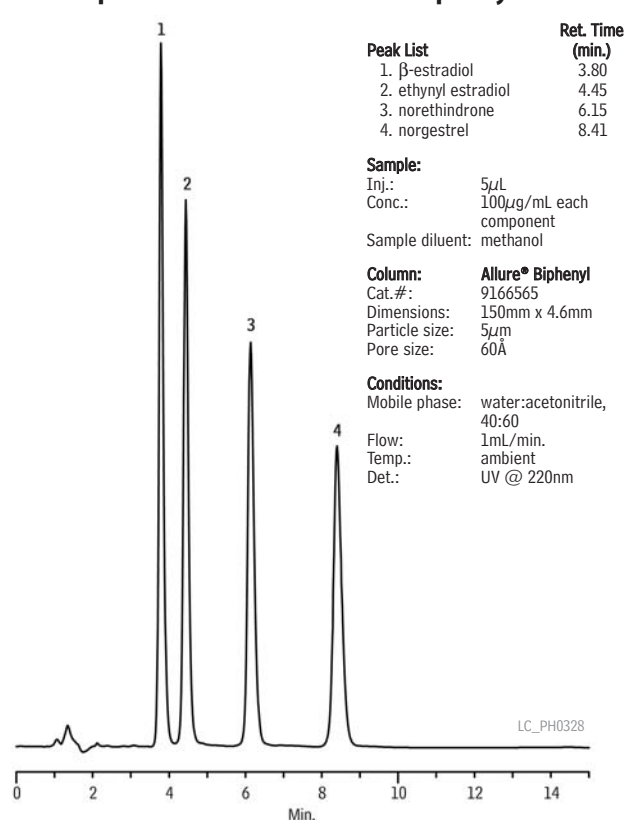


LC_PH0330

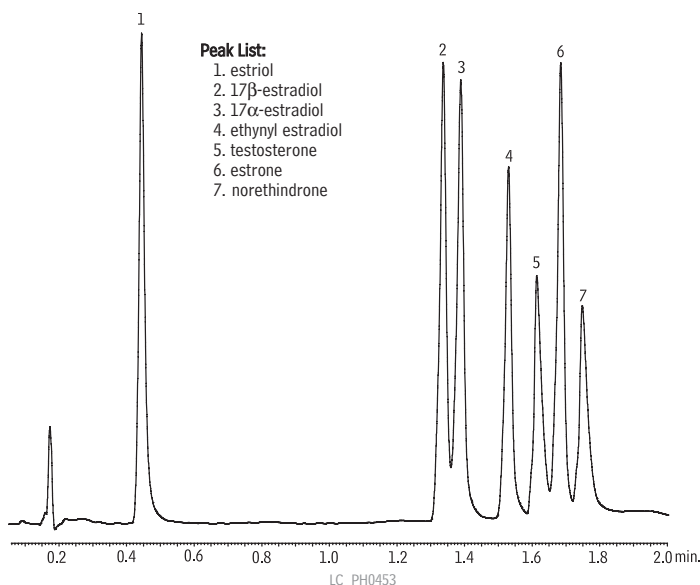
Endogenous Steroids on Allure® Biphenyl



Contraceptive Hormones on Allure® Biphenyl



Hormones on 1.9 μ m Pinnacle® DB Biphenyl



Sample:
 Inj.: 1 μ L
 Conc.: 100 μ g/mL each component
 Sample diluent: water:methanol (50:50)

Column: 1.9 μ m Pinnacle® DB Biphenyl
 Cat. #: 9409252
 Dimensions: 50mm x 2.1mm
 Particle size: 1.9 μ m
 Pore size: 140Å

Conditions:
 Mobile phase: A: water
 B: methanol

Time(min)	%B
0	30
1	30
3	70

Flow: 0.8 mL/min.
 Temp.: 30°C
 Det.: UV @ 220nm

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Laxative Lactulose Concentrate by USP 25: Resolution Solution on Pinnacle® II Amino

Peak List:	Conc. (mg/mL)	Ret. Time (min.)	RRT	Res.	Inj. % RSD (n = 5)
1. fructose	0.4	4.6	0.44	—	—
2. galactose	6.4	6.1	0.58	—	—
3. epi-lactose	unknown	10.0	0.95	—	—
4. lactulose	40	10.5	1.00	1.1	0.3%
5. lactose	4.8	12.7	1.21	2.9	—

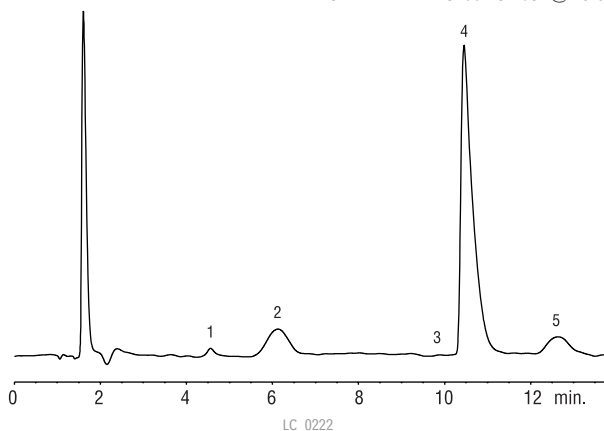
Sample:

Inj.: 20µL resolution standard
Solvent: acetonitrile:water (50:50)

Column: Pinnacle® II Amino
Cat. #: 9217365
Dimensions: 150mm x 4.6mm
Particle size: 3µm
Pore size: 110Å

Conditions:

Mobile phase: 10mM sodium phosphate monobasic in water, pH 4.8: acetonitrile (22:78, v/v)
Flow: 1.3mL/min.
Temp.: 40°C
Det.: refractive index @ 40°C



Xanthines on Pinnacle® DB C18

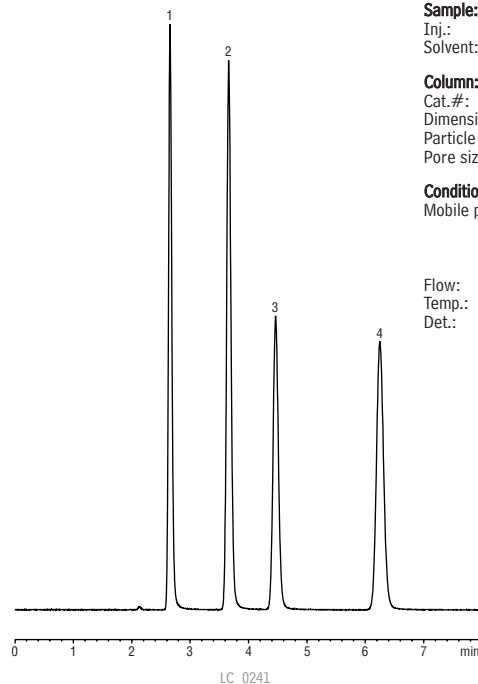
Sample:

Inj.: 2µL
Solvent: mobile phase

Column: Pinnacle® DB C18
Cat. #: 9414565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 140Å

Conditions:

Mobile phase: 20mM KH₂PO₄, pH 3.0: acetonitrile (90:10 v/v)
Flow: 1.0mL/min.
Temp.: 27°C
Det.: UV @ 254nm



Peak List:	Conc. (µg/mL)
1. theobromine	225
2. theophylline	418
3. β-hydroxyethyltheophylline	418
4. caffeine	400

Admixtures: Hydrocodone Bitartrate/Acetaminophen by USP 25 on Ultra C18

Peak List:	Conc. (µg/mL)	Ret. Time (min.)	RRT	Tailing	Resolution	Inj. % RSD (n = 5)
1. acetaminophen	0.76	3.304	1.0	1.1	—	1.1
2. hydrocodone bitartrate	0.0076	6.664	2.0	1.1	17.0	0.9

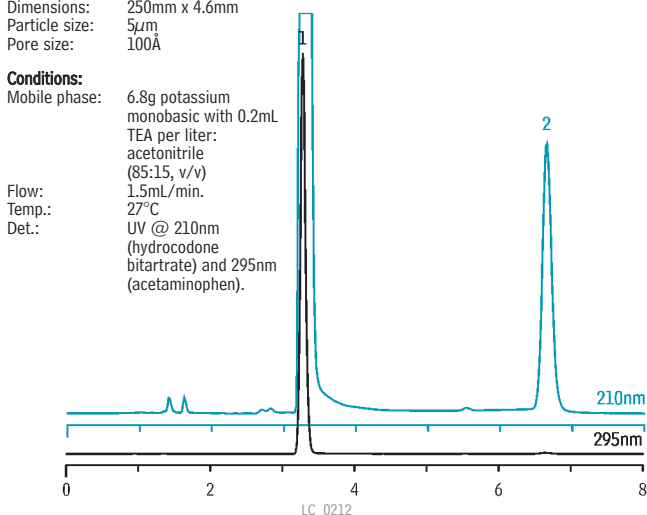
Sample:

Inj.: 25µL
Sample: 500mg acetaminophen with 5mg hydrocodone bitartrate (tablet)
Solvent: mobile phase

Column: Ultra C18
Cat. #: 9174575
Dimensions: 250mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

Mobile phase: 6.8g potassium monobasic with 0.2mL TEA per liter: acetonitrile (85:15, v/v)
Flow: 1.5mL/min.
Temp.: 27°C
Det.: UV @ 210nm (hydrocodone bitartrate) and 295nm (acetaminophen).



Admixtures: Expectorant/Antitussive Guaifenesin and Narcotic Analgesic Codeine on Ultra Phenyl

Peak List:	Conc. (µg/mL)
1. codeine	825
2. guaifenesin	375

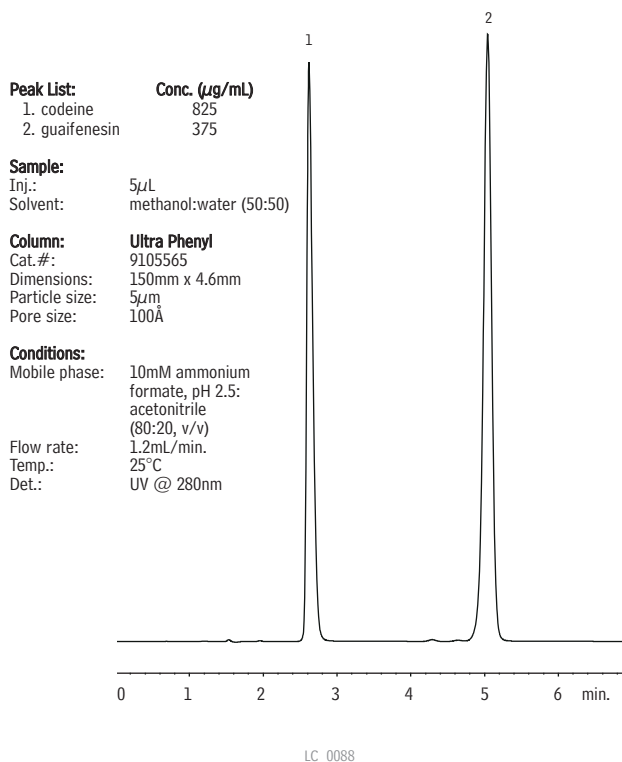
Sample:

Inj.: 5µL
Solvent: methanol:water (50:50)

Column: Ultra Phenyl
Cat. #: 9105565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:

Mobile phase: 10mM ammonium formate, pH 2.5: acetonitrile (80:20, v/v)
Flow rate: 1.2mL/min.
Temp.: 25°C
Det.: UV @ 280nm

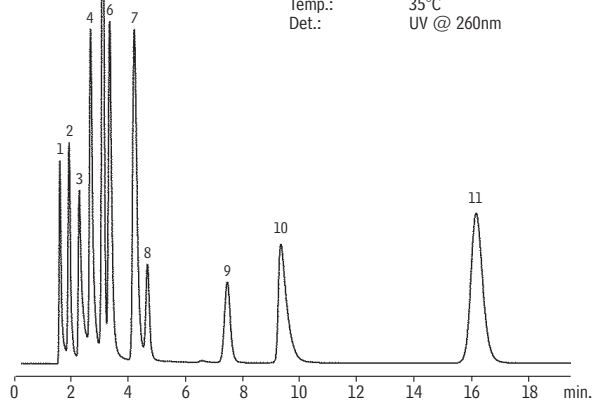


Nucleotides, Nucleosides, and Nitrogenous Bases on Ultra IBD

Peak List:	Conc. (µg/mL)	Sample:
1. CDP	146	Inj.: 20µL
2. CMP	113	Solvent: 20mM ammonium acetate, pH 5.8
3. ATP	117	
4. ADP	145	
5. cytidine	155	
6. TMP	157	
7. AMP	125	
8. guanine	36	
9. guanosine	103	
10. adenine	38	
11. adenosine	115	

Column: Ultra IBD
Cat. #: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: 20mM ammonium acetate, pH 5.8: methanol (97.5:2.5)
Flow: 1.0mL/min.
Temp.: 35°C
Det.: UV @ 260nm



LC_0128

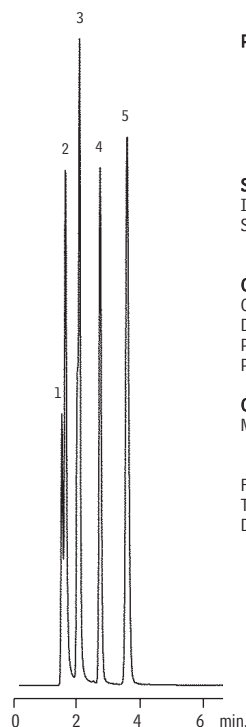
Uracil, Uridine, UTP, UDP, and UMP on Ultra IBD

Peak List:	Conc. (µg/mL)
1. UTP	360
2. UDP	360
3. UMP	284
4. uracil	90
5. uridine	230

Sample:
Inj.: 20µL
Solvent: 20mM ammonium acetate, pH 5.8

Column: Ultra IBD
Cat. #: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: 20mM ammonium acetate, pH 5.8: methanol (97.5:2.5)
Flow: 1.0mL/min.
Temp.: 35°C
Det.: UV @ 260nm



LC_0133

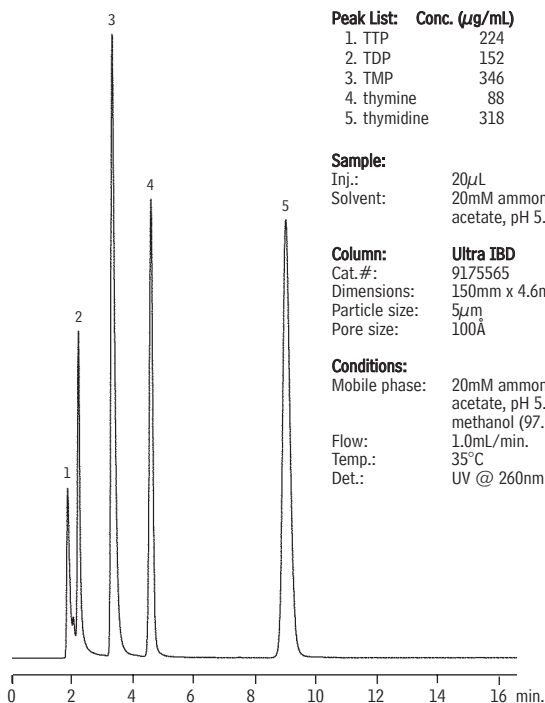
Thymine, Thymidine, TTP, TDP, and TMP on Ultra IBD

Peak List:	Conc. (µg/mL)
1. TTP	224
2. TDP	152
3. TMP	346
4. thymine	88
5. thymidine	318

Sample:
Inj.: 20µL
Solvent: 20mM ammonium acetate, pH 5.8

Column: Ultra IBD
Cat. #: 9175565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Mobile phase: 20mM ammonium acetate, pH 5.8: methanol (97.5:2.5)
Flow: 1.0mL/min.
Temp.: 35°C
Det.: UV @ 260nm



LC_0132

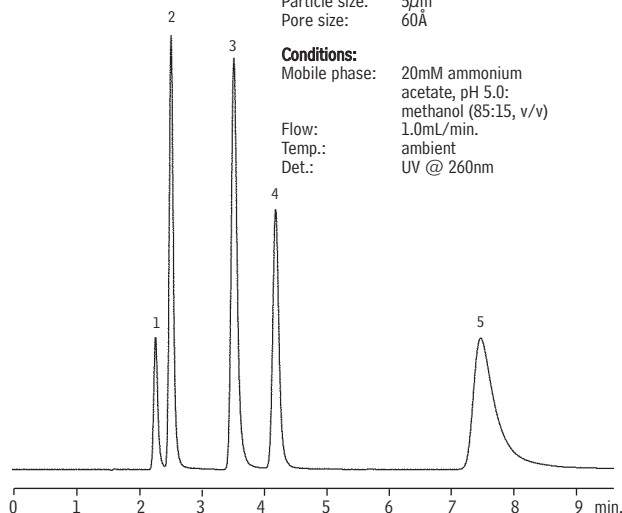
Nucleic Acid Bases on Allure® PFP Propyl

Peak List:
1. cytosine
2. uracil
3. guanine
4. thymine
5. adenine

Sample:
Inj.: 1.0µL
Conc.: 100µg/mL each
Solvent: 20 mM ammonium acetate, pH 5.0
Note: 1-3 drops of ammonium hydroxide added to keep guanine in solution

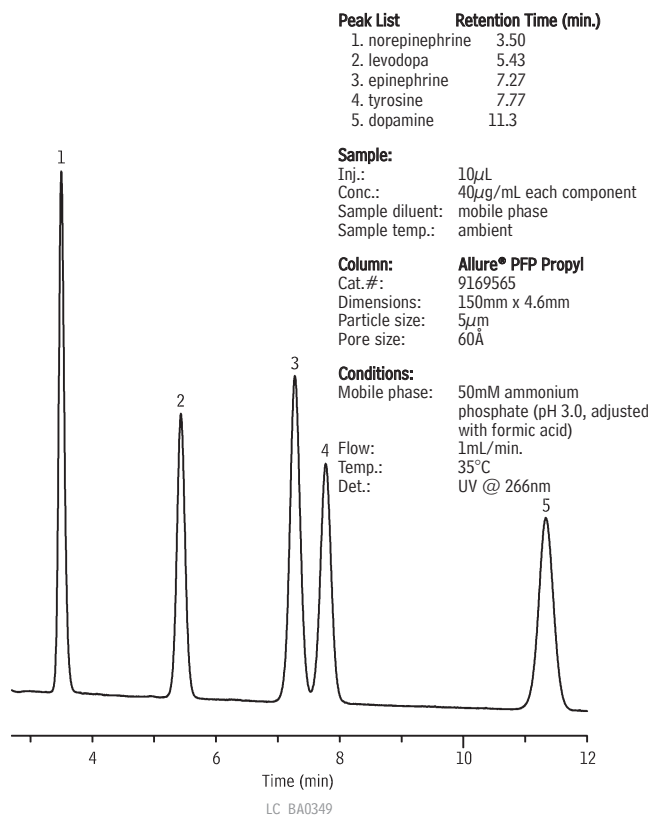
Column: Allure® PFP Propyl
Cat. #: 9169565
Dimensions: 150mm x 4.6mm
Particle size: 5µm
Pore size: 60Å

Conditions:
Mobile phase: 20mM ammonium acetate, pH 5.0: methanol (85:15, v/v)
Flow: 1.0mL/min.
Temp.: ambient
Det.: UV @ 260nm

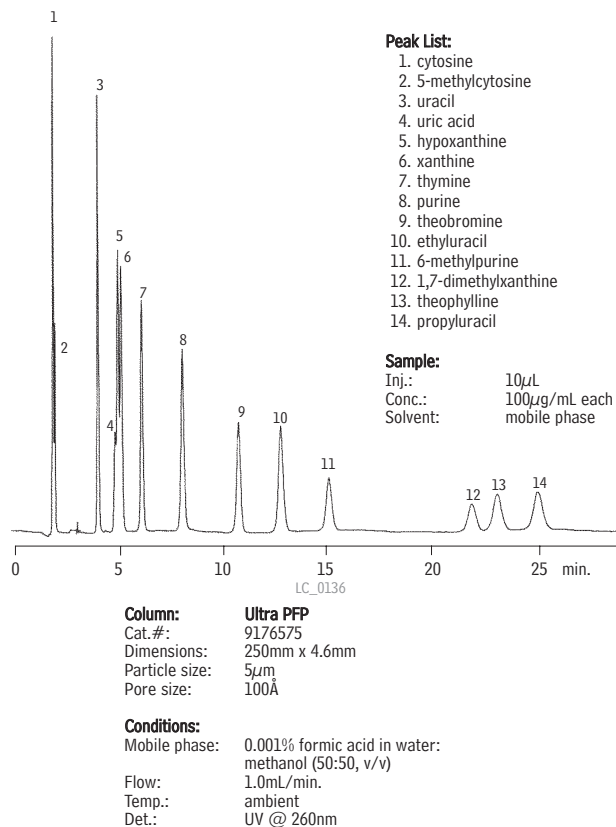


LC_0137

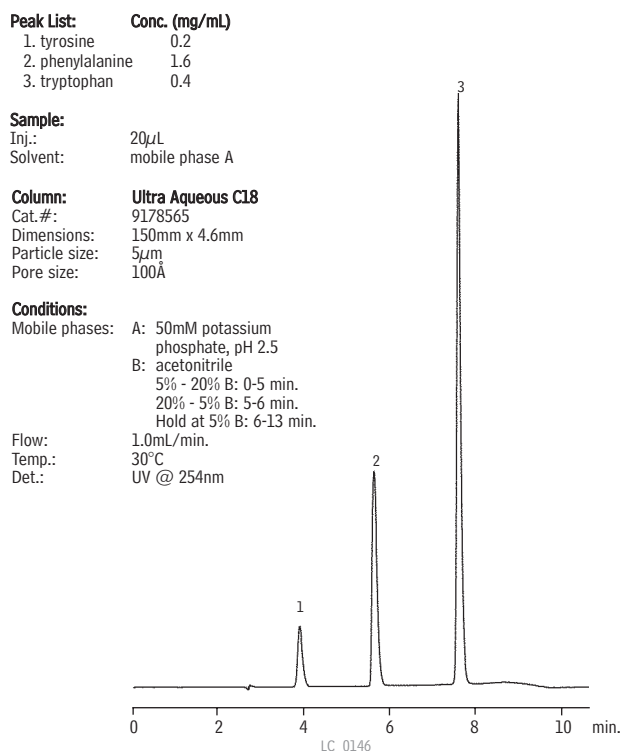
Catecholamines on Allure® PFP Propyl



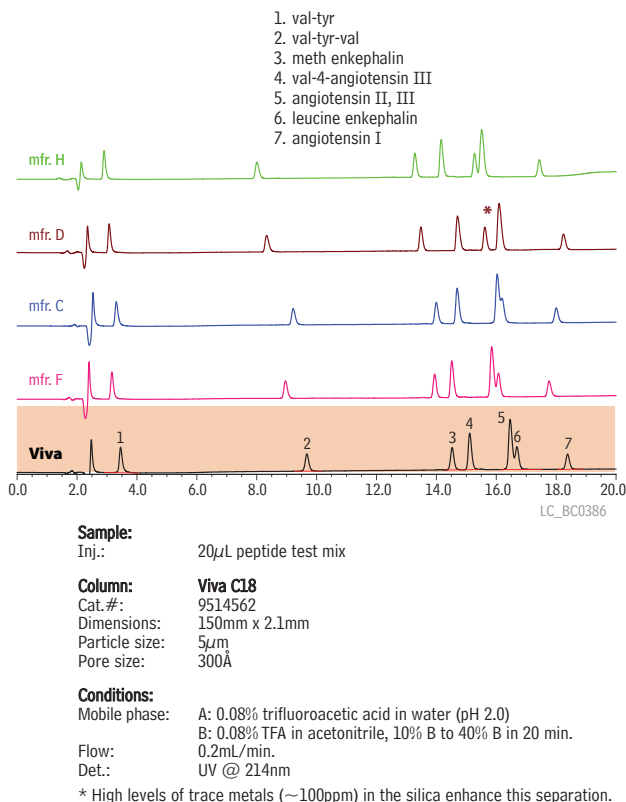
Purines/Pyrimidines on Ultra PFP



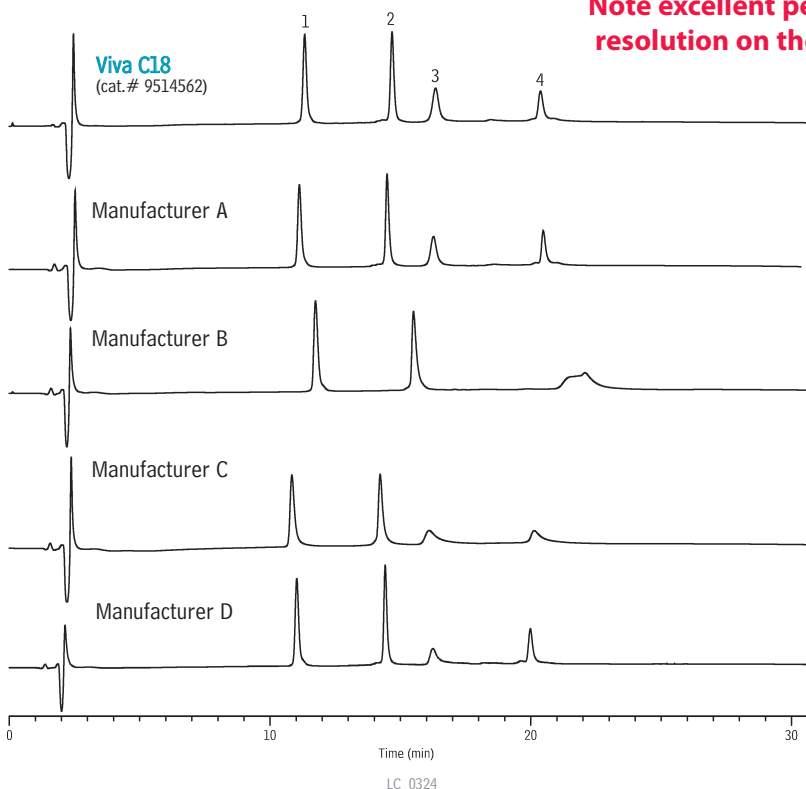
Aromatic Amino Acids on Ultra Aqueous C18



Peptide Mix on Viva C18



Protein Mix on Viva C18



Note excellent peak shapes and resolution on the Viva column!

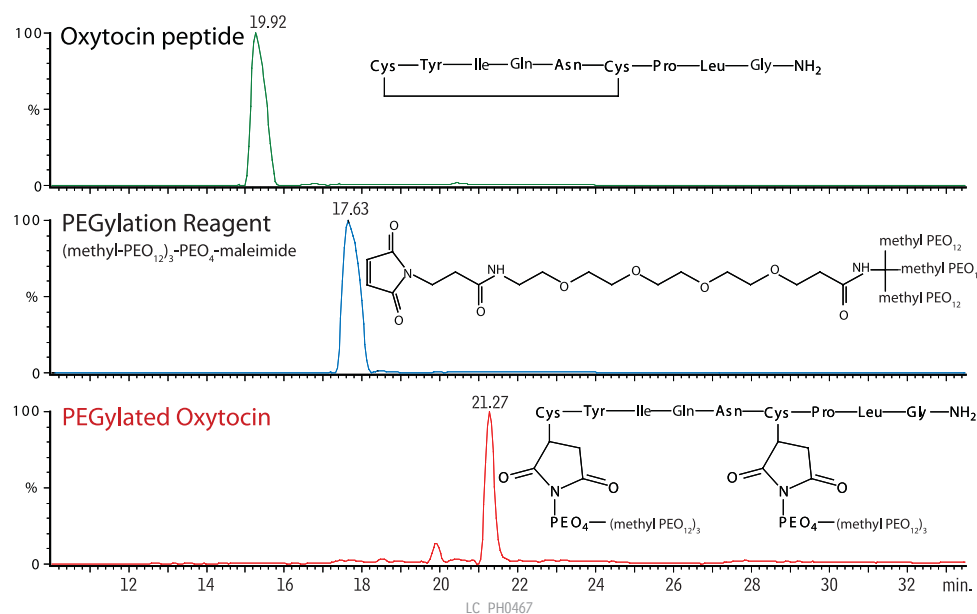
Peak List	Ret. Time (min.)
1. ribonuclease A	11.31
2. cytochrome c	14.65
3. holo-transferrin	16.32
4. apomyoglobin	20.34

Sample:
 Inj.: 20 μ L
 Conc.: 0.08mg/mL each protein
 Sample diluent: 0.10% TFA in water / 0.10% TFA in acetonitrile, 80:20, v/v
 Sample temp.: 25°C

Columns: **Wide Pore C18**
 Dimensions: 150mm x 2.1mm
 Particle size: 5 μ m
 Pore size: 300Å

Conditions:
 Mobile phase: A: 0.10% TFA in water, B: 0.10% TFA in acetonitrile, 20% B to 70% B in 30 min.
 Flow: 0.20mL/min.
 Temp.: 25°C (or ambient)
 Det.: UV @ 214nm

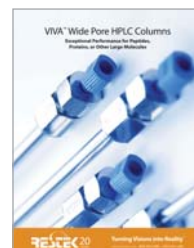
PEGylated Oxytocin on Viva C18 (LC/MS)



Sample: oxytocin PEGylation reaction products
 Inj.: 20 μ L
 Conc.: 300pmoles/ μ L
 Sample diluent: 0.1% formic acid in water (v:v)

Column: **Viva C18**
 Cat.#: 9514561
 Dimensions: 150mm x 1.0mm
 Particle size: 5 μ m
 Pore size: 300Å

Conditions:
 Mobile phase: 0.1% formic acid in water:0.1%formic acid in acetonitrile, 60:40
 Flow: 0.1mL/min.
 Temp.: ambient
 Det.: Micromass Quattro II
 Interface: ESI
 Ion mode: positive
 Temp.: 200°C
 Capillary: 2.25kV
 Cone: 40V



free literature

Viva Wide Pore HPLC Columns

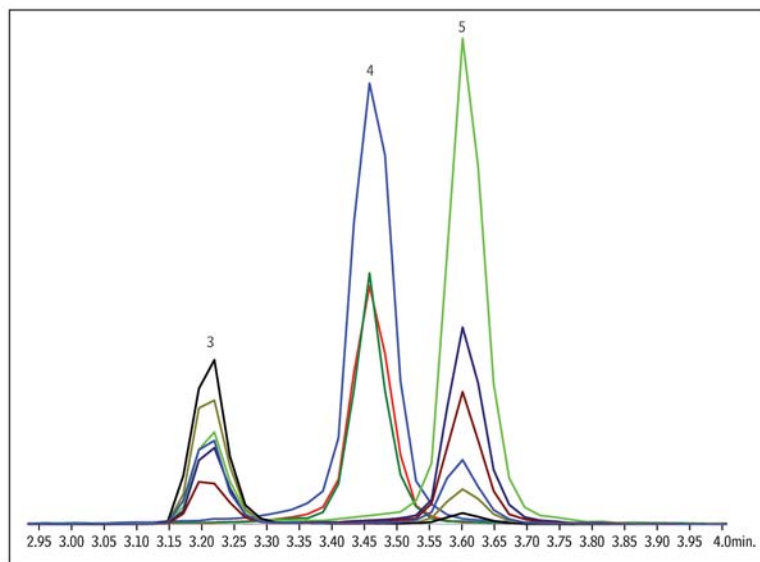
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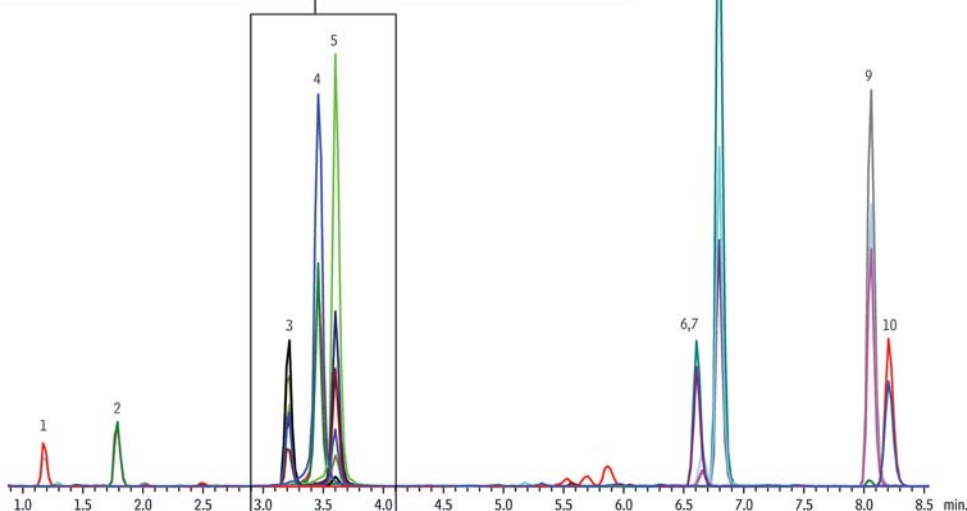
Pain Management Drugs in Urine on Ultra II® Biphenyl (LC/MS/MS)

NEW!



Peaks	RT (min.)	MRM1	MRM2
1. Acetaminophen	1.18	152/110	152/65
2. Morphine	1.79	286/157	286/181
3. Codeine	3.21	300/165	300/215
4. Oxycodone	3.46	316/298	316/241
5. Hydrocodone	3.60	300/199	300/171
6. Fentanyl	6.61	337/132	337/216
7. Buprenorphine	6.66	468/187	468/84
8. Lorazepam	6.79	321/275	321/229
9. Diazepam	8.06	285/154	285/193
10. Methadone	8.21	310/77	310/223

Recommended for opiates.



LC_CF0516

Column Ultra II® Biphenyl (cat.# 9609352)
 Dimensions: 50 mm x 2.1 mm ID
 Particle Size: 3 µm
 Pore Size: 100 Å
 Temp.: 40 °C

Sample 5 ng/mL in 1:10 urine:mobile phase
Conc.: 5 µL
Inj. Vol.:

Mobile Phase

A: 0.1% formic acid in water
 B: 0.1% formic acid in methanol

Time (min.)	Flow (mL/min.)	%A	%B
0	0.5	90	10
10	0.5	0	100
10.1	0.5	90	10
12	0.5	90	10

Detector Applied Biosystems/MDS Sciex LC/MS/MS
Model #: API-5000™
Ion Source: TurboIonSpray®
Ion Mode: ESI+
Curtain Gas: 25 psi (172.4 kPa)
Gas 1: 60 psi (413.7 kPa)
Gas 2: 40 psi (275.8 kPa)
Source Temp.: 550 °C
Source Voltage: 2000 V
Mode: MRM
Dwell Time: 50 ms

Instrument Applied Biosystems/MDS Sciex
 LC/MS/MS System

Acknowledgement Special thanks to Applied Biosystems
 for providing instrument time.

For more information on Biphenyl columns, visit

www.restek/biphenyl

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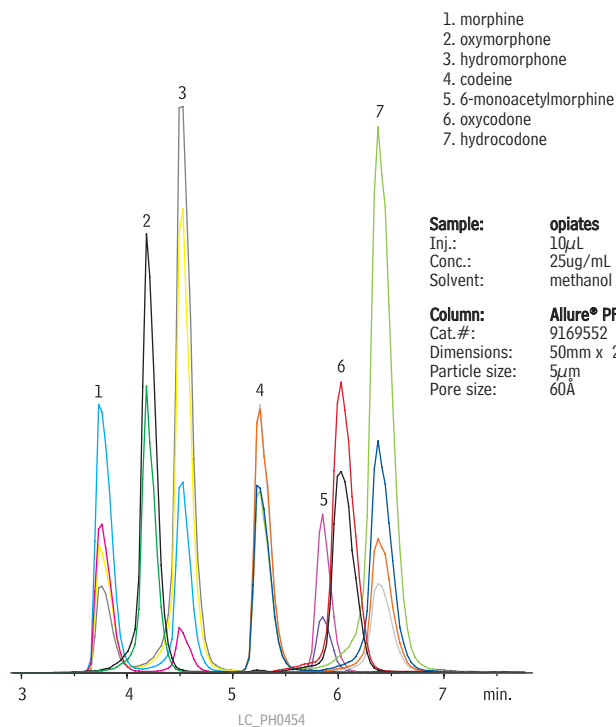
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Opiates on Allure® PFP Propyl (LC/MS/MS)

**Conditions:**

Instrument: Shimadzu Prominence HPLC
Mobile phase: A: 0.1% formic acid in water
B: 0.1% formic acid in 80:20, methanol:acetonitrile

Time:	%B
0.0	10
3.00	50
6.00	50
6.10	10
8.10	Stop pumps

Flow: 0.40 mL/min.
Temp.: 30°C

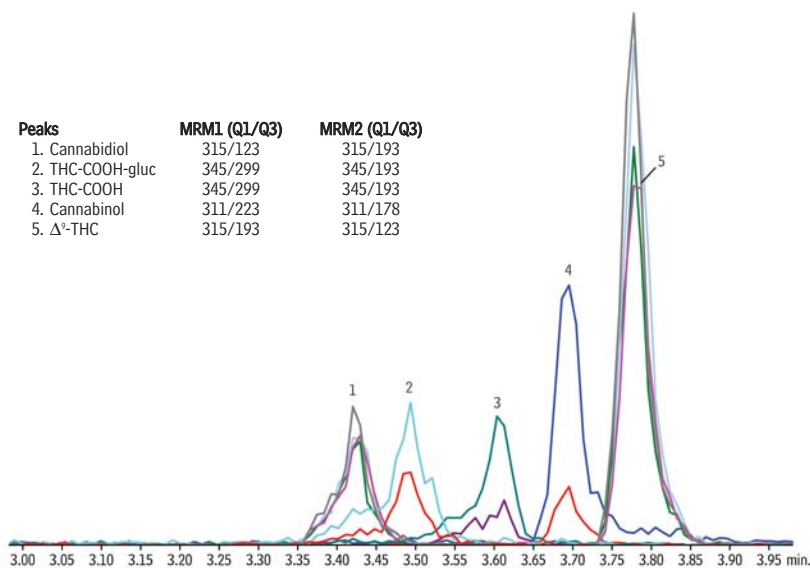
Det.: Applied Biosystems/MDS Sciex API 3200™ MS/MS system
Ion source: Electrospray, positive
Ion Spray voltage: 5,500
Gas 1: 65 psi (448 kPa)
Gas 2: 45 psi (310 kPa)
Source temp.: 600°C

Compound	Q1	Q3	Mass Spectrometer Experiments:	
			Declustering Potential (V)	Collision Energy (V)
morphine	286	152	46	79
morphine	286	165	46	51
hydromorphone	286	185	46	41
hydromorphone	286	157	46	55
oxymorphone	302	227	36	37
oxymorphone	302	198	36	55
codeine	300	152	46	85
codeine	300	115	46	89
hydrocodone	300	199	46	39
hydrocodone	300	128	46	69
oxycodone	316	240	31	39
oxycodone	316	256	31	33
6-monoacetylmorphine	328	211	51	55
6-monoacetylmorphine	328	193	51	35

THC and Metabolites on Ultra II® Biphenyl (LC/MS/MS)

NEW!

Peaks	MRM1 (Q1/Q3)	MRM2 (Q1/Q3)
1. Cannabidiol	315/123	315/193
2. THC-COOH-gluc	345/299	345/193
3. THC-COOH	345/299	345/193
4. Cannabinol	311/223	311/178
5. Δ ⁹ -THC	315/193	315/123



Column: Ultra II® Biphenyl (cat. # 9609853)
Dimensions: 50 mm x 3.0 mm ID
Particle Size: 2.2 µm
Pore Size: 100 Å
Temp.: 35 °C

Sample

Diluent: Acetonitrile
Conc.: 50 ng/mL
Inj. Vol.: 20 µL
Mobile Phase

A: 0.1% formic acid in water
B: 0.1% formic acid in methanol

Time (min.)	%B
0	50
0.50	50
3.50	100
4.50	100
4.60	50
6.00	50

Flow: 0.7 mL/min.

Detector

Model #: Applied Biosystems/MDS Sciex LC/MS/MS 3200 Q-Trap
Ion Source: TurboIonSpray®
Ion Mode: ESI+
Ion Spray Voltage: 5 kV
Curtain Gas: 25 psi (172.4 kPa)
Gas 1: 50 psi (344.7 kPa)
Gas 2: 60 psi (413.7 kPa)
Source Temp.: 550 °C
Mode: MRM
Dwell Time: 50 ms
Instrument: Applied Biosystems/MDS Sciex LC/MS/MS System

Alcohol Metabolites on Ultra II® Biphenyl (LC/MS)

NEW!

Peak List	m/z	k'	Intensity
1. matrix	125	—	—
2. ethyl glucuronide	221	2.75	220,408
3. ethyl sulfate	125	4.02	236,693

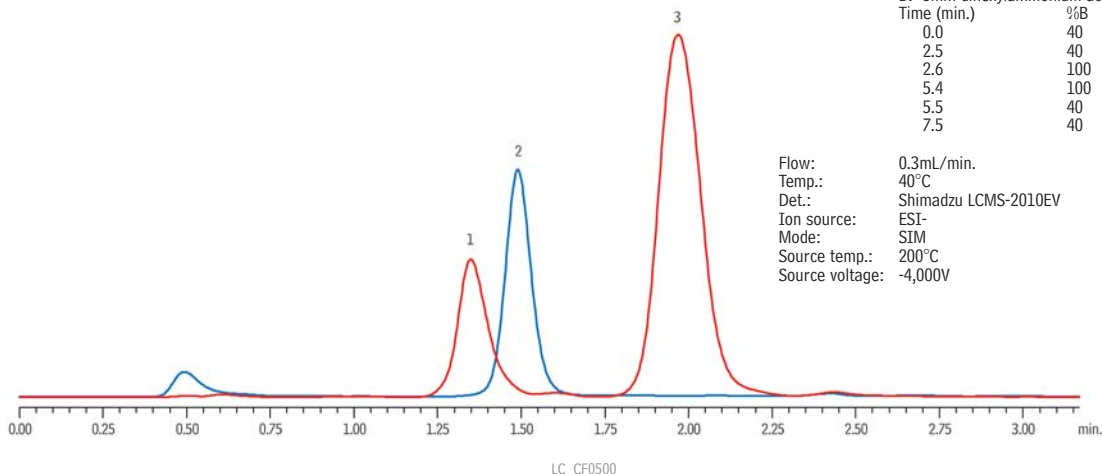
Sample:
Inj.: 5µL
Conc.: 5µg/mL each component
Sample diluent: urine diluted 1:10 with mobile phase

Column: Ultra II® Biphenyl
Cat.#: 9609552
Dimensions: 50mm x 2.1mm
Particle size: 5µm
Pore size: 100Å

Conditions:
Instrument: Shimadzu Prominence UFLCXR
Mobile phase: A: 5mM dihexylammonium acetate in water
B: 5mM dihexylammonium acetate in methanol

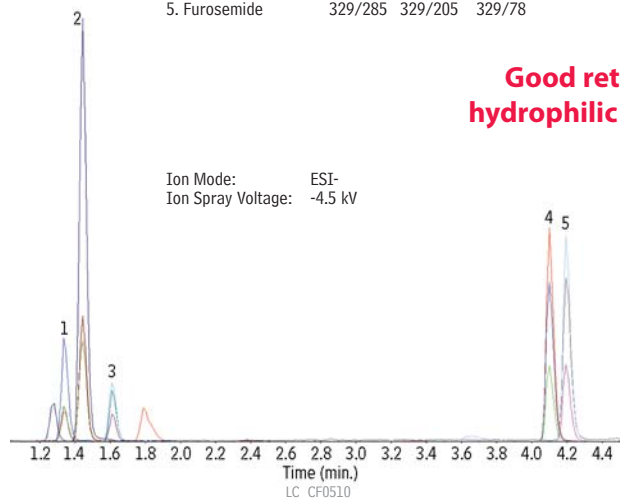
Time (min.)	%B
0.0	40
2.5	40
2.6	100
5.4	100
5.5	40
7.5	40

Flow: 0.3mL/min.
Temp.: 40°C
Det.: Shimadzu LCMS-2010EV
Ion source: ESI-
Mode: SIM
Source temp.: 200°C
Source voltage: -4,000V



Diuretics on Ultra II® Biphenyl (LC/MS/MS, Negative Run)

	MRM1 (Q1/Q3)	MRM2 (Q1/Q3)	MRM3 (Q1/Q3)
1. Acetazolamide	221/83	221/80	221/58
2. Chlorothiazide	294/214	294/179	294/215
3. Hydrochlorothiazide	296/78	296/269	296/205
4. Bendroflumethiazide	420/289	420/328	420/197
5. Furosemide	329/285	329/205	329/78

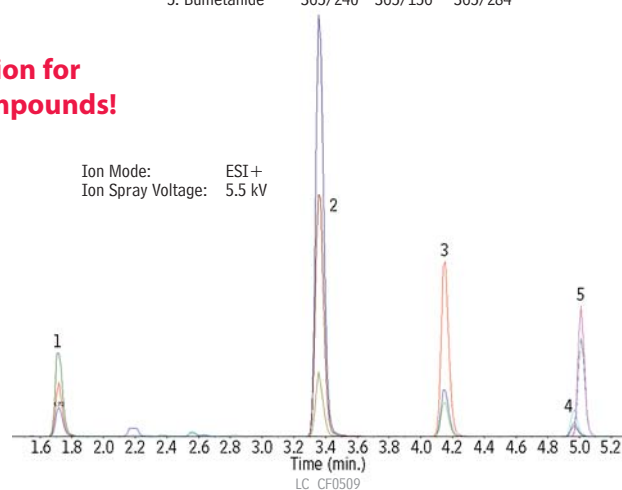


Ion Mode: ESI-
Ion Spray Voltage: -4.5 kV

Good retention for hydrophilic compounds!

Diuretics in Urine on Ultra II® Biphenyl (LC/MS/MS, Positive Run)

	MRM1 (Q1/Q3)	MRM2 (Q1/Q3)	MRM3 (Q1/Q3)
1. Amiloride	230/171	230/116	230/60
2. Triamterene	254/237	254/104	254/141
3. Indapamine	366/132	366/91	366/117
4. Ethacrynic acid	303/179	303/194	303/257
5. Bumetanide	365/240	365/156	365/284



Ion Mode: ESI+
Ion Spray Voltage: 5.5 kV

Column: Ultra II® Biphenyl (cat.# 9609352)
Dimensions: 50 mm x 2.1 mm ID
Particle Size: 3 µm
Pore Size: 100 Å
Temp.: 40°C

Sample: 50 ng/mL diuretics in urine, diluted 10x in mobile phase
Inj. Vol.: 5 µL

Mobile Phase: A: 0.1% formic acid in water
B: 0.1% formic acid in methanol

Time (min.)	Flow (mL/min.)	%A	%B
0	0.5	90	10
6.00	0.5	0	100
6.1	0.5	90	10
8.00	0.5	90	10

Detector: Applied Biosystems/MDS Sciex LC/MS/MS
Model #: API 5000
Ion Source: TurboIonSpray®
Curtain Gas: 25 psi (172.4 kPa)
Gas 1: 60 psi (413.7 kPa)
Gas 2: 40 psi (275.8 kPa)
Source Temp.: 550°C
Mode: MRM
Dwell Time: 50 ms

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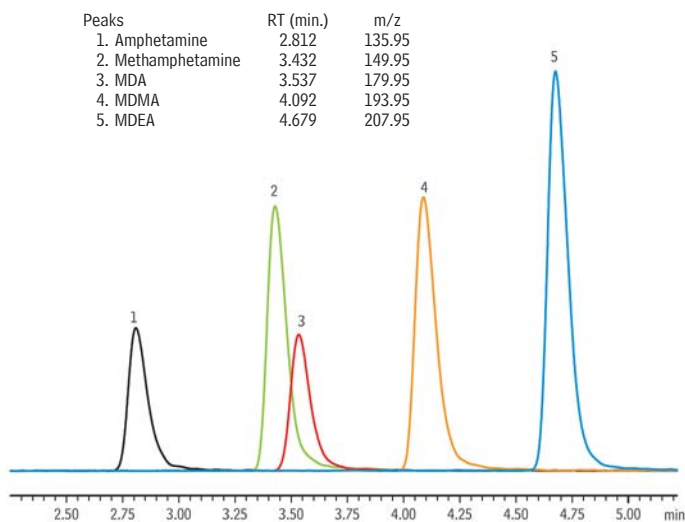
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Amphetamines on Ultra II® Biphenyl (LC/MS)

NEW!



LC_CF0518

Column Ultra II® Biphenyl (cat. # 9609552)

Dimensions: 50 mm x 2.1 mm ID

Particle Size: 5 µm

Pore Size: 100 Å

Temp.: 30 °C

Sample

Diluent: mobile phase

Conc.: 2 µg/mL

Inj. Vol.: 5 µL

Mobile Phase

A: 0.1% formic acid in water

B: 0.1% formic acid in methanol

Time (min.)	Flow (mL/min.)	%A	%B
0	0.3	80	20
10	0.3	5	95
10.1	0.3	80	20
12.0	0.3	80	20

Detector Shimadzu 2010EV

Acquisition Type: Scan

Scan Speed: 2000 amu/sec.

Heat Block: 200 °C

Interface: ESI+

Interface Temp.: 250 °C

Scan Range: 100 - 250 amu

Event Time: 0.1 sec.

Instrument Shimadzu UFLC_{XR}**Notes** Data were collected in scan mode. An extracted ion chromatogram is shown.

For more information on Biphenyl columns, visit

www.restek.com/biphenyl

Cocaine and Ecgonine Methyl Ester on Allure® PFP Propyl (LC/MS/MS)

Conditions:

Mobile phase:

5mM ammonium
formate, pH 3.0:
acetonitrile (10:90, v/v)

Flow: 0.6mL/min.

Column temp.: ambient

Det.:

Applied Biosystems/MDS SCIEX
API 3200™ MS/MS system
turbo ion spray, ESI

Interface:

150°C

Interface temp.:

positive

Ion mode:

5,000V

ESI probe voltage:

+ 71V

Orifice:

+ 265V

Ring:

nitrogen

Collision gas:

2.2 mTorr

Collision gas pressure:

28 eV (COC)

Collision gas energy:

26 eV (EME)

Electron multiplier:

2,100 volts

Auxiliary gas flow:

7,000cc/min.

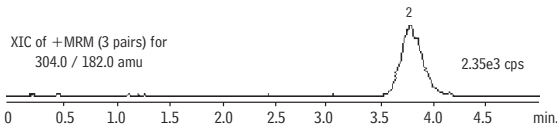
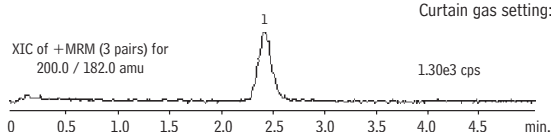
Nebulizer gas setting:

15lb/in.²

Curtain gas setting:

12lb/in.²**Peak List:**

1. EME (ecgonine methyl ester)
2. COC (cocaine)

Sample:Inj.: 10µL
Conc.: 1µg/mL
Solvent: water
Temp.: 4°C**Column:** Allure® PFP PropylCat. #: 9169532
Dimensions: 30mm x 2.1mm
Particle size: 5µm
Pore size: 60Å

Data Courtesy of Shane Needham, Pfizer Inc.

LC_0126

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Benzodiazepines on Allure® PFP Propyl (LC/MS/MS)

Sample: benzodiazepines

Inj.: 20 µL

Conc.: NA

Solvent: NA

Column: Allure® PFP Propyl

Cat. #: 9169552

Dimensions: 50mm x 2.1mm

Particle size: 5 µm

Pore size: 60 Å

Conditions:

Instrument: Shimadzu Prominence HPLC

Mobile phase: A: 0.1% formic acid and 1mM ammonium formate in water

B: 0.1% formic acid and 1mM ammonium formate in acetonitrile

Time (min.)	Flow (µL/min.)	%B
0.0	500	10
10.00	1000	90
15.00	1000	90
15.50	500	10
17.50	500	10

Flow: see gradient table

Temp.: 40°C

Det.: Applied Biosystems/MDS Sciex API 3200™ MS/MS system

Ion Source: Electrospray, positive

IonSpray

Voltage: NA

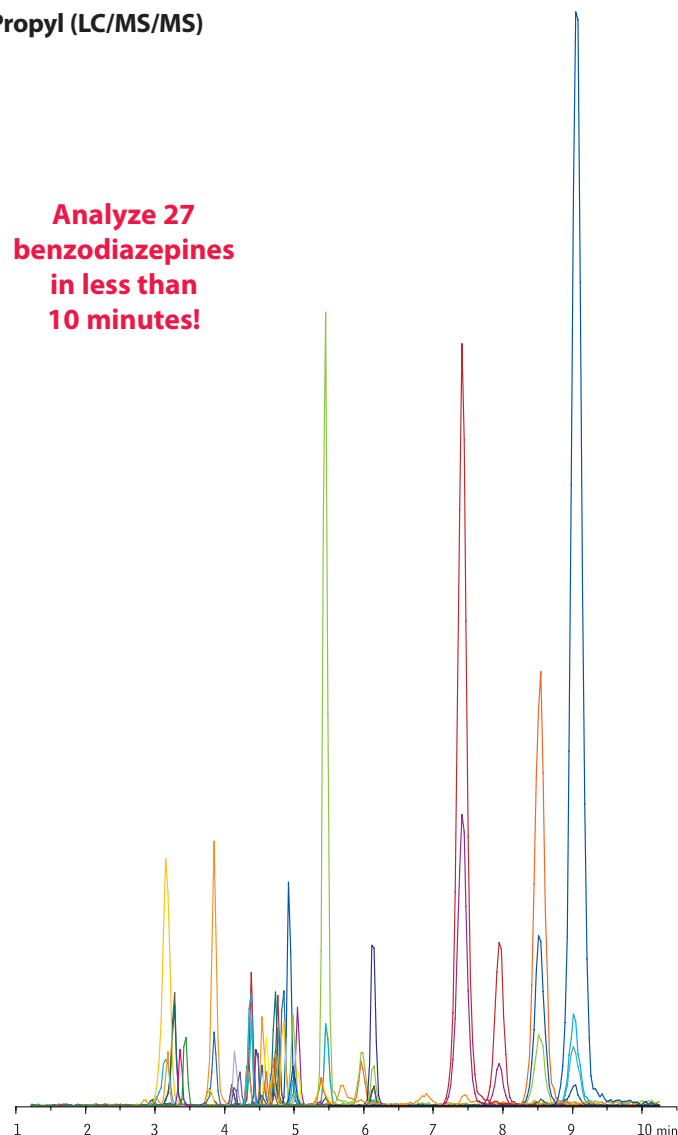
Gas 1: NA

Gas 2: NA

Source Temp.: 500°C

Data courtesy of: Applied Biosystems MDS Sciex

Analyze 27
benzodiazepines
in less than
10 minutes!



LC_PH0463

MRM Transitions, retention times,
and LOQ values.

Compound Name	Retention Time (min.)	Precursor Ion (amu)	MRM 1 (amu)	MRM 2 (amu)	DP	CE (MRM 1)	CE (MRM 2)	LOQ (ng/mL)
7-aminonitrazepam	3.2	252.1	121.1	94.0	51	35	53	1.0
7-aminoclonazepam	3.3	286.1	121.0	222.2	46	41	35	0.5
7-aminoflunitrazepam	3.8	284.1	135.1	226.0	51	39	49	0.5
Bromazepam	3.8	316.0/318.0	182.1	182.1	51	45	45	5.0
α-hydroxyalprazolam	4.1	325.1	297.2	204.9	51	31	59	2.0
α-hydroxytriazolam	4.1	359.0	239.2	176.0	61	63	37	5.0
Oxazepam	4.2	287.0	241.1	268.9	41	27	19	10.0
Lorazepam	4.3	321.0/323.1	275.0	277.0	41	31	27	5.0
Estazolam	4.4	295.0	205.0	267.1	51	53	31	2.0
Zaleplon	4.4	306.2	236.3	264.2	56	35	27	0.5
2-hydroxyethylflurazepam	4.5	333.1	211.2	109.0	56	51	41	1.0
Desmethyflunitrazepam	4.5	300.1	254.2	198.2	56	35	51	2.0
Nitrazepam	4.6	282.0	236.1	180.2	71	35	51	2.0
Clonazepam	4.7	316.0	270.2	214.0	56	41	51	2.0
Desalkylflurazepam	4.7	289.1	140.1	226.1	71	41	39	2.0
Temazepam	4.7	301.1/303.1	255.1	257.2	35	30	30	5.0
Triazolam	4.7	343.0	238.9	314.9	61	53	37	1.0
Alprazolam	4.8	309.1	205.1	281.1	56	53	35	1.0
Lormetazepam	4.8	335.0/337.1	289.0	291.1	41	29	29	2.0
Clobazam	4.9	301.1	259.1	224.3	46	29	47	1.0
Flunitrazepam	5.0	314.0	268.1	239.1	56	35	49	1.0
Nordiazepam	5.0	271.1	140.2	164.9	46	37	35	2.0
Zolpiclone	5.4	389.1	244.8	217.0	16	25	41	1.0
D5-Diazepam	5.4	290.1	198.2	-	55	41	-	-
Diazepam	5.5	285.0	193.2	154.1	55	41	37	1.0
Chlordiazepoxide	6.0	300.1	227.1	283.2	36	31	21	5.0
Prazepam	6.1	325.1	271.1	140.0	81	31	53	2.0
Zolpidem	7.4	308.1	235.1	236.1	56	39	35	0.2
Midazolam	7.9	326.1	291.3	222.0	56	33	63	0.5
Flurazepam	8.5	388.2	315.1	317.1	36	27	27	0.1
Medazepam	9.0	271.0	91.1	207.3	46	41	39	2.0
D3-Doxepine	9.1	283.0	107.1	-	41	35	-	-

Bar color indicates shared precursor ions.
Note compounds with shared precursor ions
are baseline resolved on the Allure® PFP
Propyl column, as shown by retention time
comparison.

Data courtesy of Applied Biosystems MDS Sciex.

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