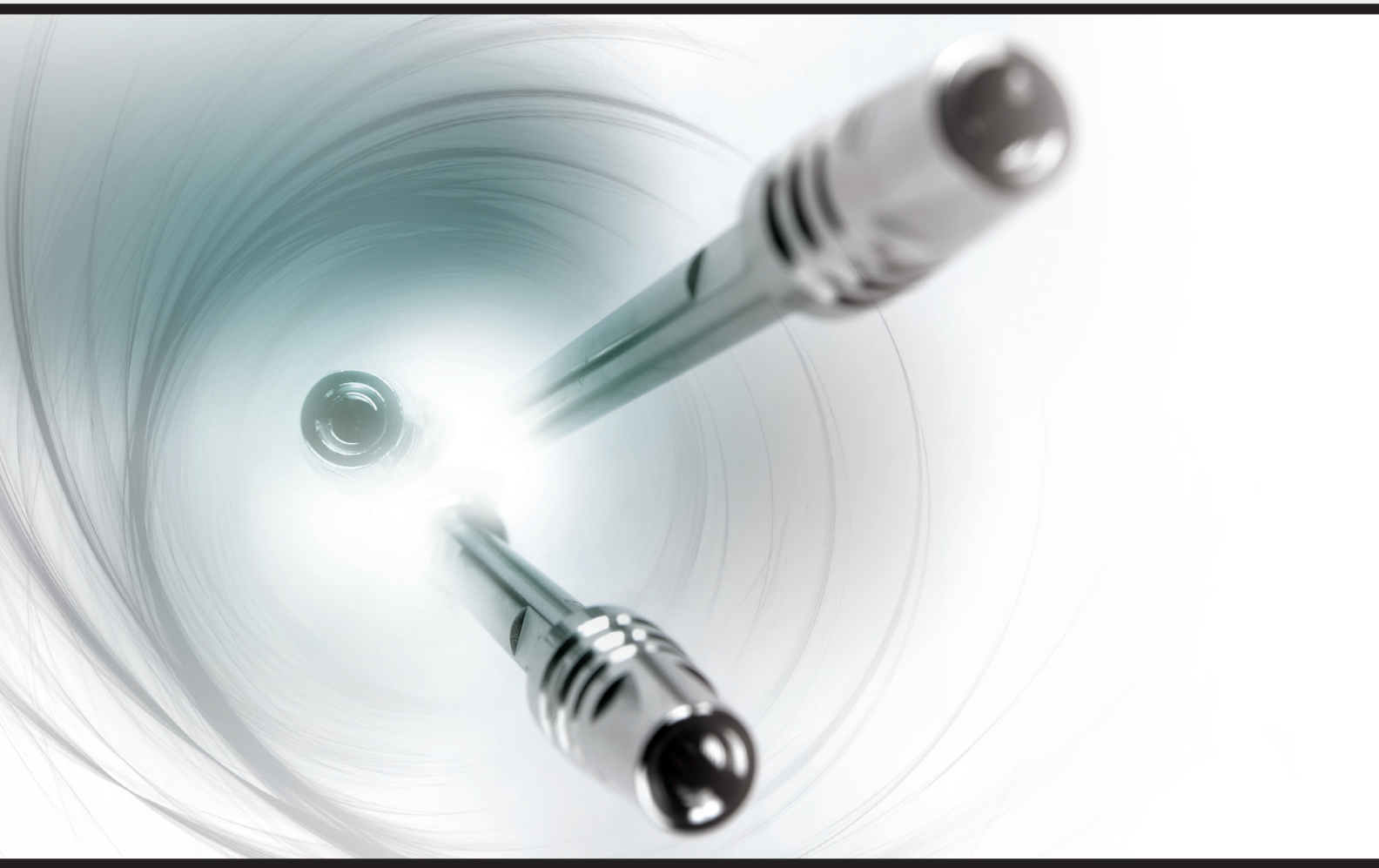
CORTECS COLUMNS

APPLICATIONS NOTEBOOK



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C_{18}+

CORTECS UPLC 1.6 µm Applications

CORTECS 2.7 µm Applications

C_{18}

CORTECS UPLC 1.6 µm Applications

C_{18} *CONTINUED*

CORTECS UPLC 1.6 µm Applications *Continued*

CORTECS 2.7 µm Applications

HILIC

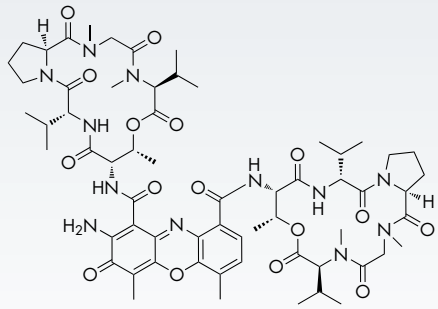
CORTECS UPLC 1.6 µm Applications

CORTECS 2.7 µm Applications

Analysis of Actinomycins from *Streptomyces* sp. using CORTECS UPLC 1.6 µm Columns

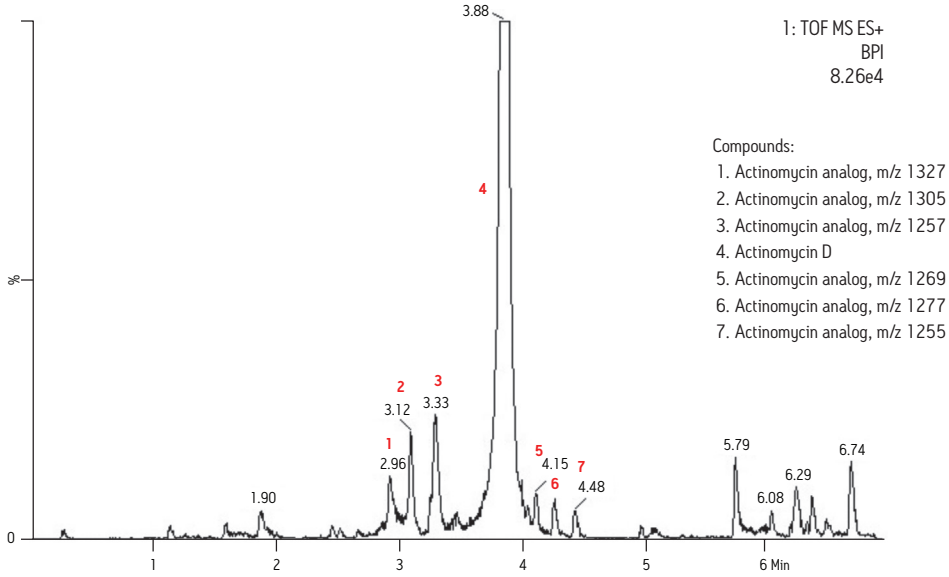
CONDITIONS

System:	ACQUITY UPLC® with Xevo® G2 QToF Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	Water with 0.1% formic acid
Mobile phase B:	Acetonitrile with 0.1% formic acid
Flow rate:	0.6 mL/min
Gradient:	2 to 98% B in 5.5 minutes, hold 1 minute, equilibrate at 2% B
Run time:	7 minutes
Injection volume:	1 µL
Column temp.:	30 °C
Scan mode:	ESI+ 200–1500 amu
Cone voltage:	30 V
Desolvation gas:	800 L/hr
Desolvation temp.:	280 °C
Capillary voltage:	3 kV
Sample:	10 mL *Streptomyces* sp. fermentation broth extracted with 10 mL 80:20 EtoAc/methanol
Identification:	Compounds identified by accurate mass using MassLynx® Software



Actinomycin D
mw: 1255.42
$C_{62}H_{86}N_{12}O_{16}$

Actinomycins from Streptomyces sp.



Compounds:
1. Actinomycin analog, m/z 1327
2. Actinomycin analog, m/z 1305
3. Actinomycin analog, m/z 1257
4. Actinomycin D
5. Actinomycin analog, m/z 1269
6. Actinomycin analog, m/z 1277
7. Actinomycin analog, m/z 1255

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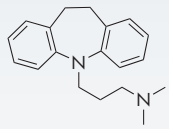
Analysis of Basic Impurities using CORTECS UPLC 1.6 µm Columns

CONDITIONS

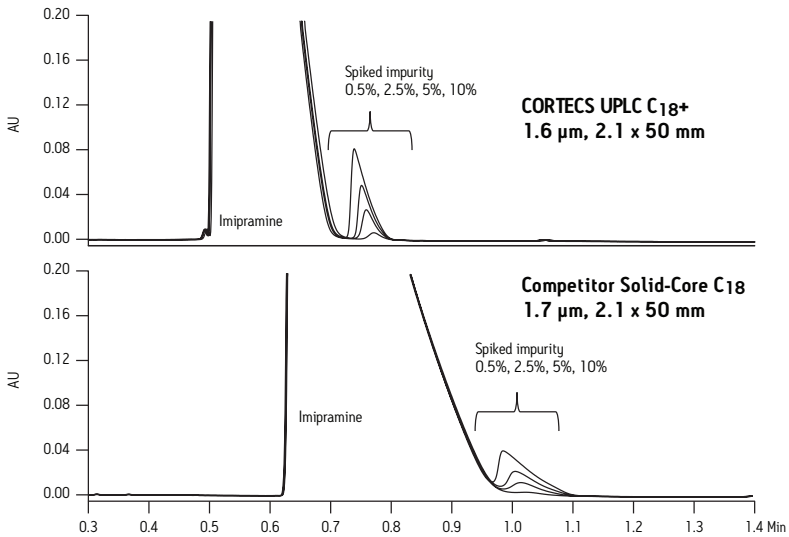
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Columns:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
	Competitor Solid-Core C_{18}, 1.7 µm, 2.1 x 50 mm
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Flow rate:	0.6 mL/min
Gradient:	See table
Injection volume:	5.0 µL
Column temp.:	30 °C
Sample preparation:	Imipramine (0.5 mg/mL), with various concentrations of amitriptyline (0.5, 2.5, 5, and 10%) prepared in water



Imipramine

Time (min)	Flow Rate (mL/min)	%A	%B
0.0	0.6	75	25
2.0	0.6	65	35
3.0	0.6	5	95
3.1	0.6	75	25
5.0	0.6	75	25

Spiked impurity analysis



Comparative separations may not be representative in all applications.

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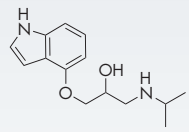
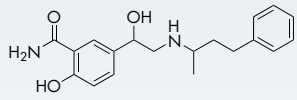
Analysis of Beta Blockers using CORTECS UPLC 1.6 µm Columns

CONDITIONS

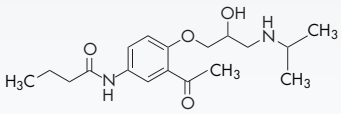
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
2D UV channels:	260 nm
Flow rate:	0.4 mL/min
Gradient:	See table
Sampling rate:	80 pts/sec
Time constant filter:	Fast
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	Water



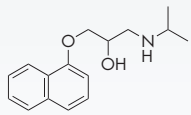
Pindolol



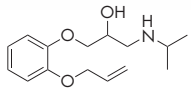
Labetolol



Acebutolol

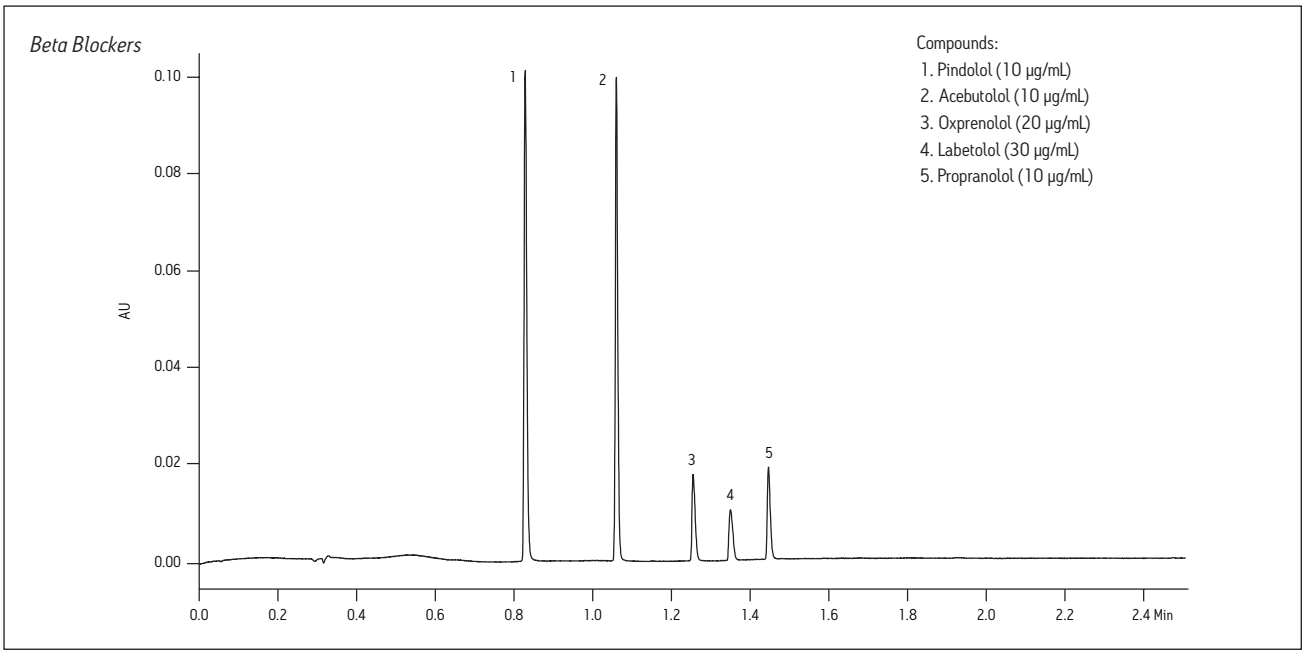


Propranolol



Oxprenolol

Time (min)	Flow Rate (mL/min)	%A	%B
0.0	0.5	95	5
4.5	0.5	5	95
5.0	0.5	5	95
5.1	0.5	95	5
6.0	0.5	95	5



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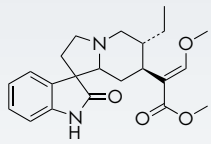
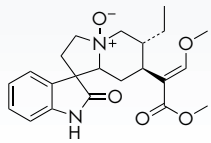
Analysis of Cat's Claw Bark using CORTECS UPLC 1.6 µm Columns

CONDITIONS

System:	ACQUITY UPLC® with Xevo® G2 QToF Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 100 mm (p/n 186007116)
Mobile phase A:	Water with 0.1% formic acid
Mobile phase B:	Acetonitrile with 0.1% formic acid
Flow rate:	0.6 mL/min
Gradient:	15 to 30% B in 4.5 minutes, ramp to 90% B in 1 minute, hold to 7 minutes, equilibrate at 15% B
Run time:	8 minutes
Injection volume:	1 µL
Column temp.:	30 °C
Scan mode:	ESI+ 200–1000 amu
Cone voltage:	30 V
Desolvation gas:	800 L/hr
Desolvation temp.:	280 °C
Capillary voltage:	3 kV
Sample:	485 mg Cat's Claw Bark (Uncaria tomentosa) extracted with 4 mL 50:50 EtoAc/methanol
Identification:	Mass extracted from total ion chromatogram (TIC) and compounds identified by accurate mass using MassLynx® Software

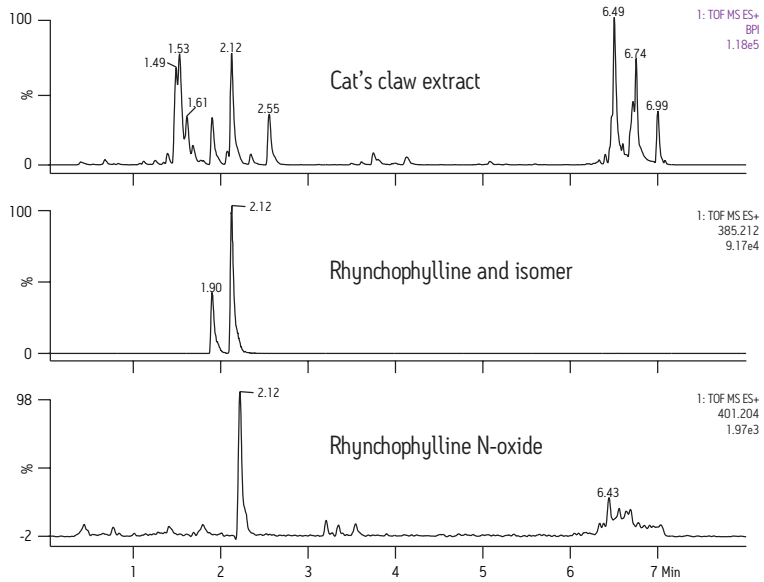


Rhynchophylline
$C_{22}H_{28}N_2O_4$
mw 384.47



Rhynchophylline-N-oxide
$C_{22}H_{28}N_2O_5$
mw 400.47

Cat's Claw Bark



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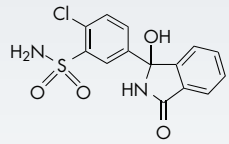
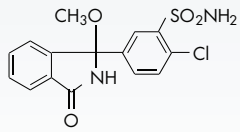
Analysis of Chlortalidone Base Degradation using CORTECS UPLC 1.6 µm Columns

CONDITIONS

System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Gradient:	See table
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	Methanol
Sample preparation:	Chlortalidone subjected to 0.2 mL 1 N sodium hydroxide and heated at 60 °C for 20 hours



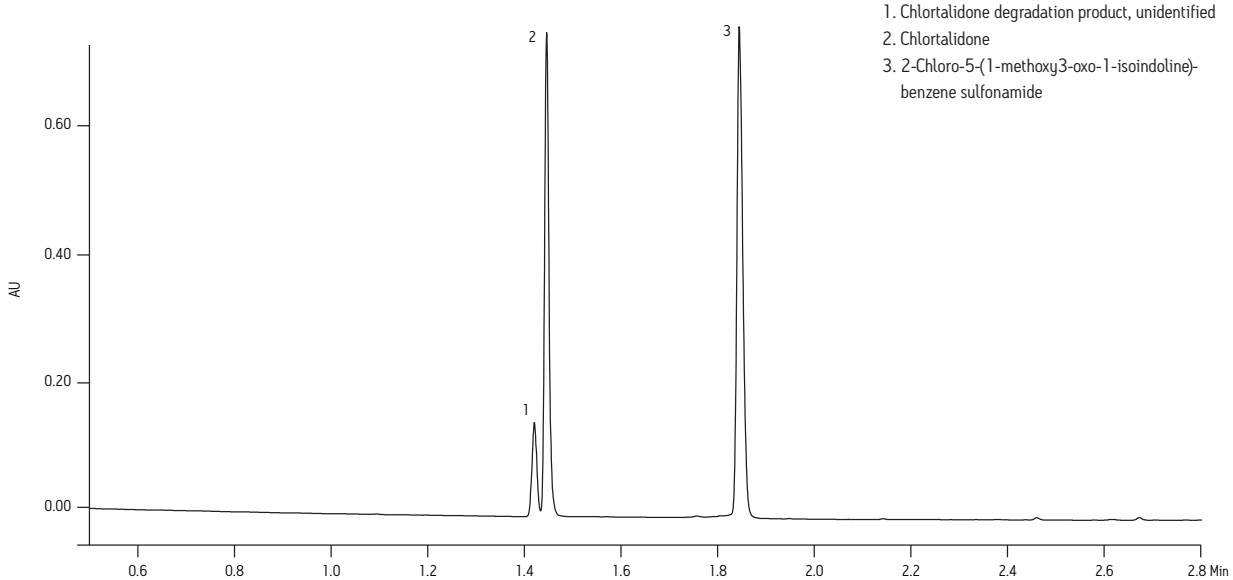
Chlortalidone



Chlortalidone Degradation Product: 2-Chloro-5-(1-methoxy3-oxo-1-isoindoline)-benzene sulfonamide

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	95	5
5.0	0.6	5	95
5.5	0.6	5	95
5.6	0.6	95	5
7.0	0.6	95	5

Chlortalidone Base Degradation



Compounds:
1. Chlortalidone degradation product, unidentified
2. Chlortalidone
3. 2-Chloro-5-(1-methoxy3-oxo-1-isoindoline)-benzene sulfonamide

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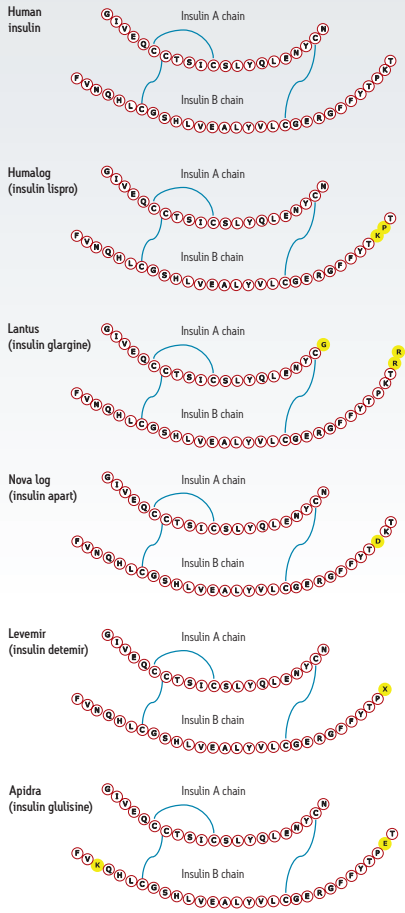
Analysis of Intact Human Insulin and Five Analogs in Human Plasma using CORTECS UPLC 1.6 µm Columns

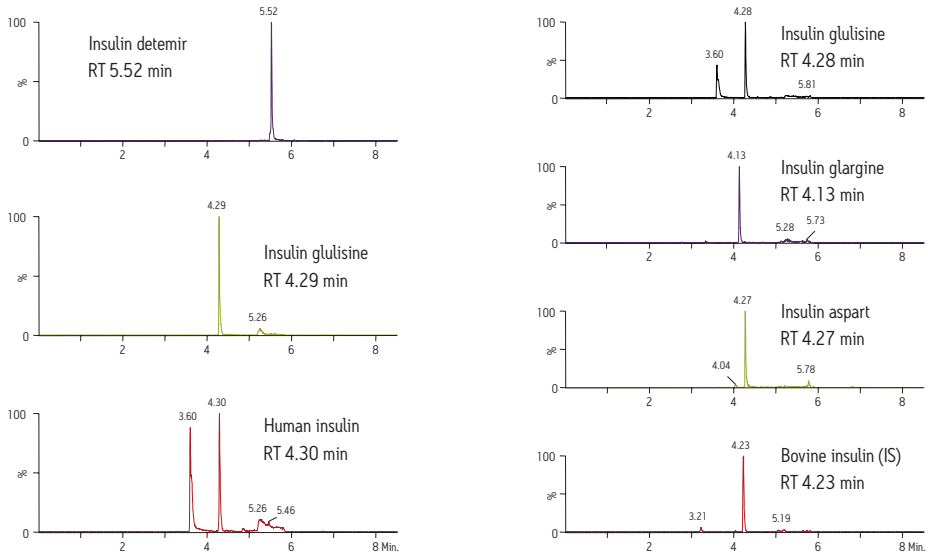
CONDITIONS

System:	ACQUITY UPLC® I-Class with 2D Technology, configured for at-column dilution with trap and back elution with Xevo® TQ-S Mass Spectrometer
Analytical column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Trap column:	XBridge® C_{18} *IS*™, 3.5 µm, 2.1 x 20 mm (p/n 186003019)
Elution mobile phase A:	0.1% formic acid in water
Elution mobile phase B:	0.1% formic acid in acetonitrile
Gradient:	Load for two minutes; switch valve and back elute from trap column onto analytical column with a linear gradient from 15 to 40% B over four minutes
Elution flow rate:	0.25 mL/min
Column temp.:	60 °C
Sample temp.:	15 °C
Injection volume:	30 µL
Collection plates:	Waters® 1-mL ACQUITY® collection plates

To see the full application note, visit www.waters.com and search for literature code: 720004727EN



Human Insulin, five-insulin analogs, and bovine insulin



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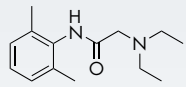
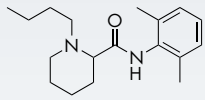
Analysis of Local Anesthetics by Reversed-Phase LC using CORTECS UPLC 1.6 µm Columns

CONDITIONS

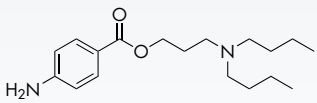
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 245 nm
Gradient:	See table
Flow rate:	0.6 mL/min
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	Water



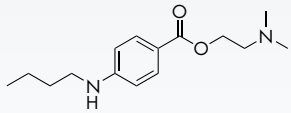
Lidocaine



Bupivacaine

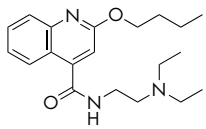


Butacaine

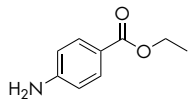


Tetracaine

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	95	5
1.0	0.6	65	35
2.0	0.6	65	35
5.5	0.6	5	95
5.6	0.6	95	5
7.0	0.6	95	5



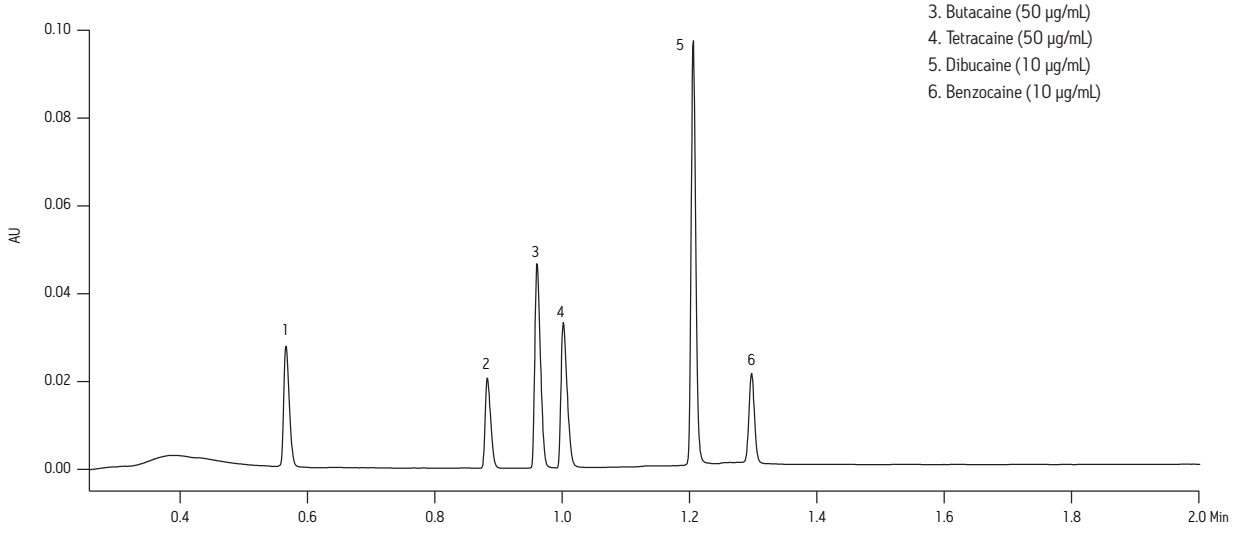
Dibucaine



Benzocaine

Local Anesthetics

Compounds:
1. Lidocaine (50 µg/mL)
2. Bupivacaine (50 µg/mL)
3. Butacaine (50 µg/mL)
4. Tetracaine (50 µg/mL)
5. Dibucaine (10 µg/mL)
6. Benzocaine (10 µg/mL)



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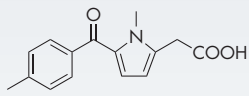
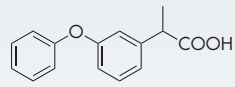
Analysis of NSAIDs using CORTECS UPLC 1.6 µm Columns

CONDITIONS

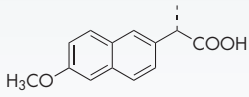
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 270 nm
Data rate	20 pts/sec
Filter time:	Normal
Gradient:	See table
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample:	NSAIDs mix at 50–100 µg/mL in water



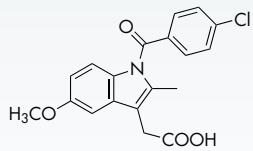
Tolmetin



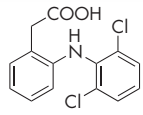
Fenoprofen



Naproxen



Indomethacin

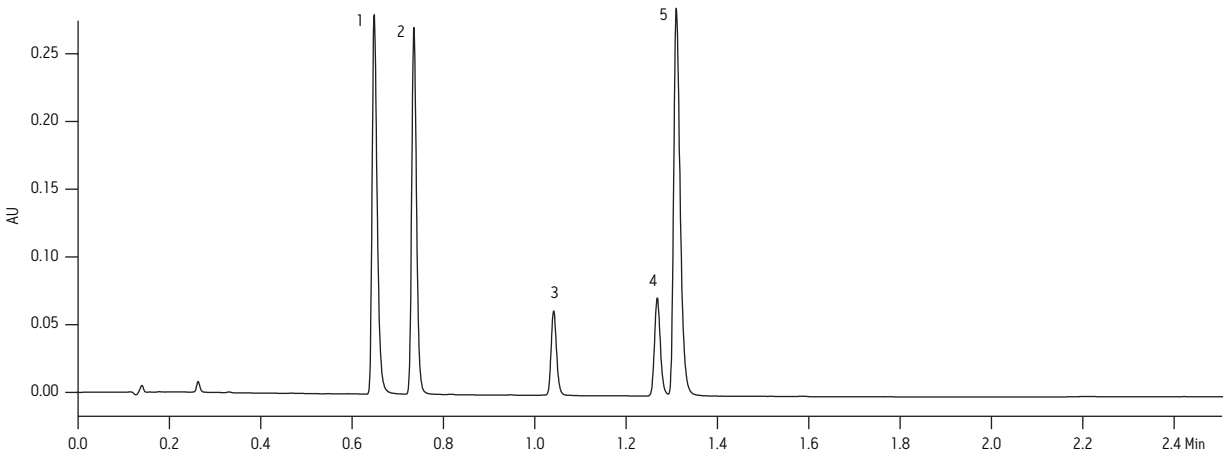


Diclofenac

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.8	65	35
2.2	0.8	35	65
2.3	0.8	35	65
2.4	0.8	65	35
3.0	0.8	65	35

NSAIDs

Compounds:
1. Tolmetin
2. Naproxen
3. Fenoprofen
4. Indomethacin
5. Diclofenac



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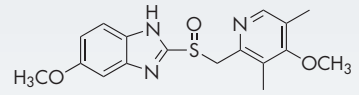
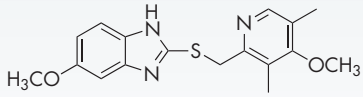
Analysis of Omeprazole Tablet Acid Degradation using CORTECS UPLC 1.6 µm Columns

CONDITIONS

System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Gradient:	See table
Flow rate:	0.6 mL/min
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	50% methanol in water
Sample preparation:	Omeprazole subjected to 1 N HCl and left at room temperature for 20 minutes



Omeprazole

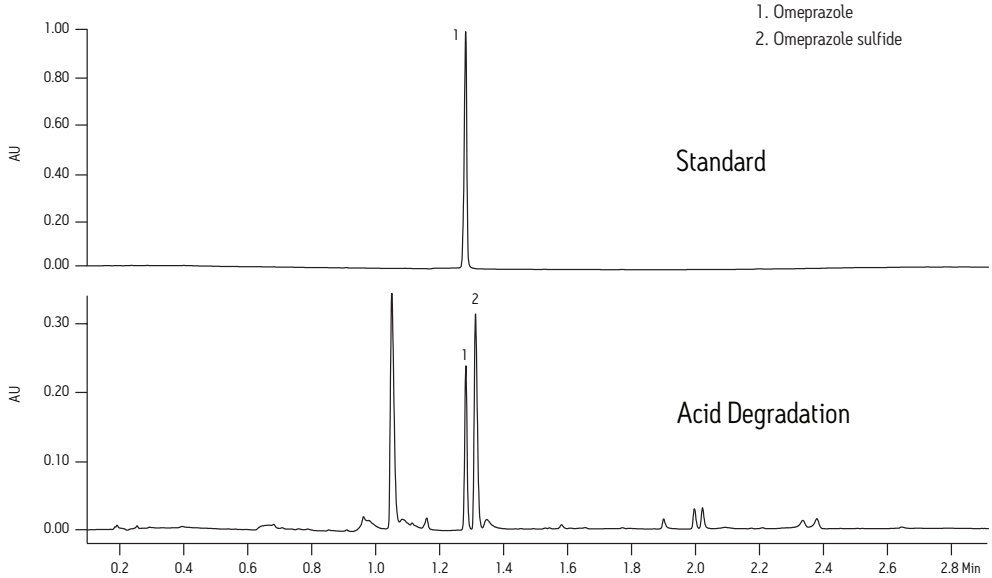


Omeprazole sulfide

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	95	5
5.0	0.6	5	95
5.5	0.6	5	95
5.6	0.6	95	5
7.0	0.6	95	5

Omeprazole Acid Degradation

Compounds:
1. Omeprazole
2. Omeprazole sulfide



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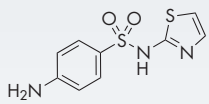
Analysis of Sulfa Drugs using CORTECS UPLC 1.6 µm Columns

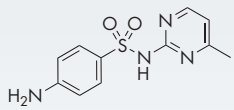
CONDITIONS

System:	ACQUITY UPLC® H-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Flow rate:	0.5 mL/min
Gradient:	See table
Injection volume:	4.0 µL
Column temp.:	30 °C
Sample diluent:	Water

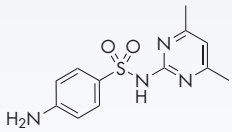
Time (min)	Flow Rate (mL/min)	%A	%B
0.0	0.5	95	5
5.0	0.5	40	60
5.5	0.5	40	60
5.6	0.5	95	5
7.0	0.5	95	5



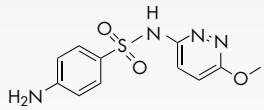
Sulfathiazole



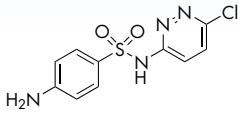
Sulfamerazine



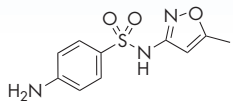
Sulfamethazine



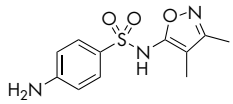
Sulfamethoxypyridazine



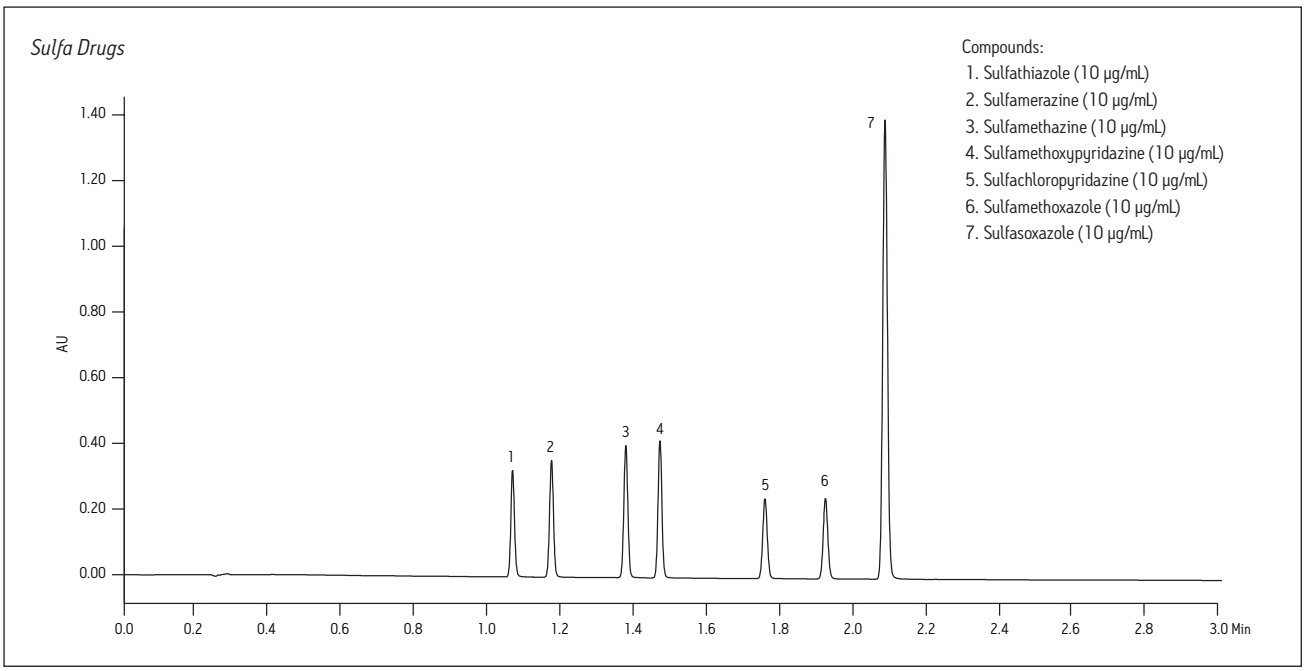
Sulfachloropyridazine



Sulfamethoxazole



Sulfasoxazole



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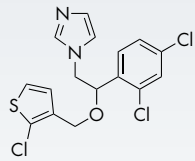
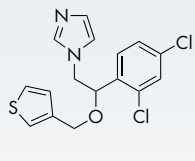
Analysis of Tioconazole Impurities using CORTECS UPLC 1.6 µm Columns

CONDITIONS

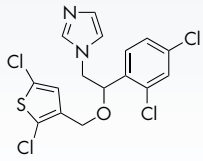
System:	ACQUITY UPLC® with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 219 nm
Gradient:	See table
Flow rate:	0.6 mL/min
Injection volume:	4.0 µL
Column temp.:	30 °C
Sample diluent:	Methanol
Sample:	Tioconazole USP Related Compounds



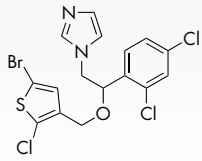
Tioconazole



Related Compound A



Related Compound B

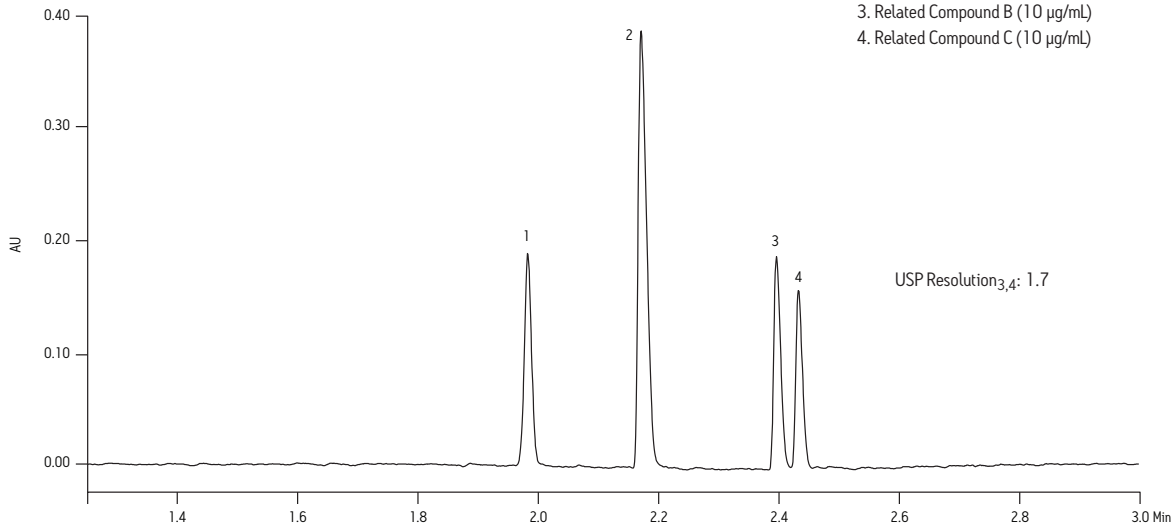


Related Compound C

Time (min)	Flow Rate (mL/min)	%A	%B
0.0	0.6	98	2
4.0	0.6	25	75
4.5	0.6	25	75
4.6	0.6	98	2
6.0	0.6	98	2

Tioconazole Impurities

Compounds:
1. Related Compound A (10 µg/mL)
2. Tioconazole (20 µg/mL)
3. Related Compound B (10 µg/mL)
4. Related Compound C (10 µg/mL)



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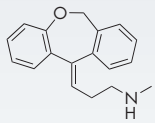
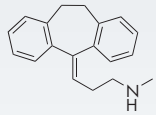
Analysis of Tricyclic Antidepressants using CORTECS UPLC 1.6 µm Columns

CONDITIONS

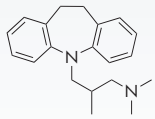
System:	ACQUITY UPLC® H-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}+, 1.6 µm, 2.1 x 50 mm (p/n 186007114)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Flow rate:	0.6 mL/min
Gradient:	See table
Injection volume:	1.0 µL
Column temp.:	40 °C
Sample diluent:	Water



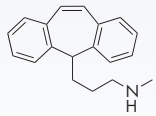
Nordoxepin



Nortriptyline

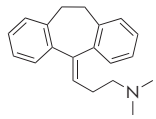


Trimipramine



Protriptyline

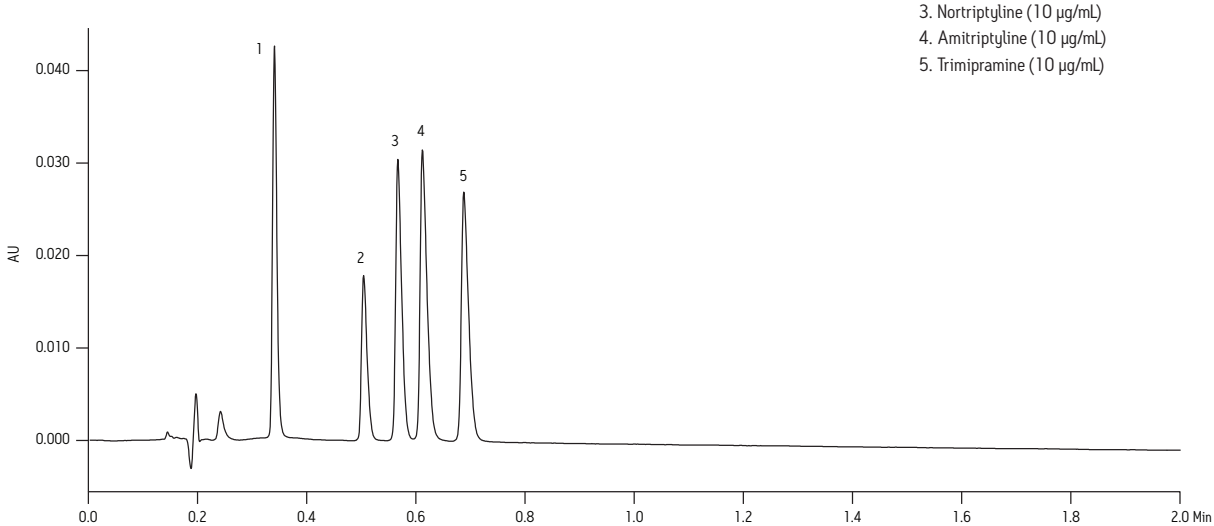
Time (min)	Flow Rate (mL/min)	%A	%B
0.0	0.6	72	28
3.0	0.6	65	35
3.5	0.6	5	95
3.6	0.6	72	28
6.0	0.6	72	28



Amitriptyline

Tricyclic Antidepressants

Compounds:
1. Nordoxepin (10 µg/mL)
2. Protriptyline (10 µg/mL)
3. Nortriptyline (10 µg/mL)
4. Amitriptyline (10 µg/mL)
5. Trimipramine (10 µg/mL)



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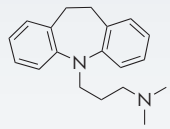
Analysis of Basic Impurities using CORTECS 2.7 µm Columns

CONDITIONS

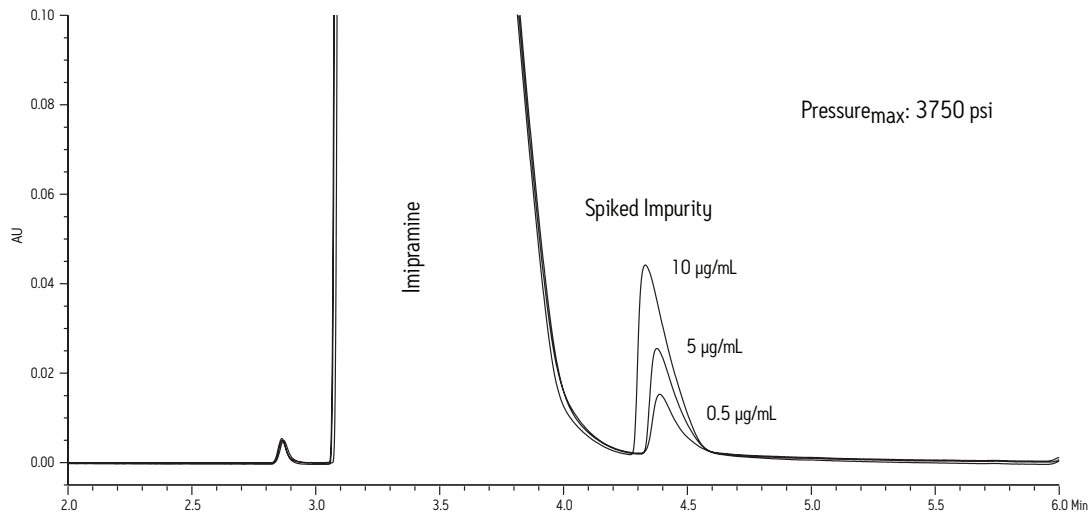
System:	Alliance® HPLC with 2998 Photodiode Array Detector
Column:	CORTECS® C_{18}+, 2.7 µm, 4.6 x 150 mm (p/n 186007408)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Flow rate:	1.5 mL/min
Gradient:	See table
Injection volume:	36 µL
Column temp.:	30 °C
Sample preparation:	Imipramine (0.5 mg/mL), with various concentrations of amitriptyline (10 µg/mL, 5 µg/mL, and 0.5 µg/mL) prepared in water



Imipramine

Time (min)	%A	%B	Curve
0.0	75	25	–
11.3	65	35	6
12.0	65	35	6
12.1	75	25	6
15.0	75	25	6

Imipramine spiked impurity analysis



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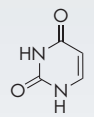
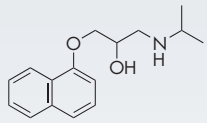
Analysis of the Reversed-Phase Quality Control Reference Material (QCRM) using CORTECS 2.7 µm Columns

CONDITIONS

System:	ACQUITY UPLC® with PDA Detector
Column:	CORTECS® C_{18}+, 2.7 µm, 2.1 x 100 mm (p/n 186007397)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Flow rate:	1.0 mL/min
Gradient:	See table
Injection volume:	2.0 µL
Column temp.:	30 °C
Sample:	Reversed-Phase QCRM (p/n 186006363)

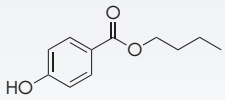


Uracil

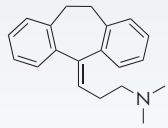


Propranolol

Acenaphthene

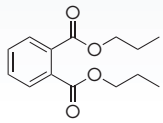


Butylparaben



Amitriptyline

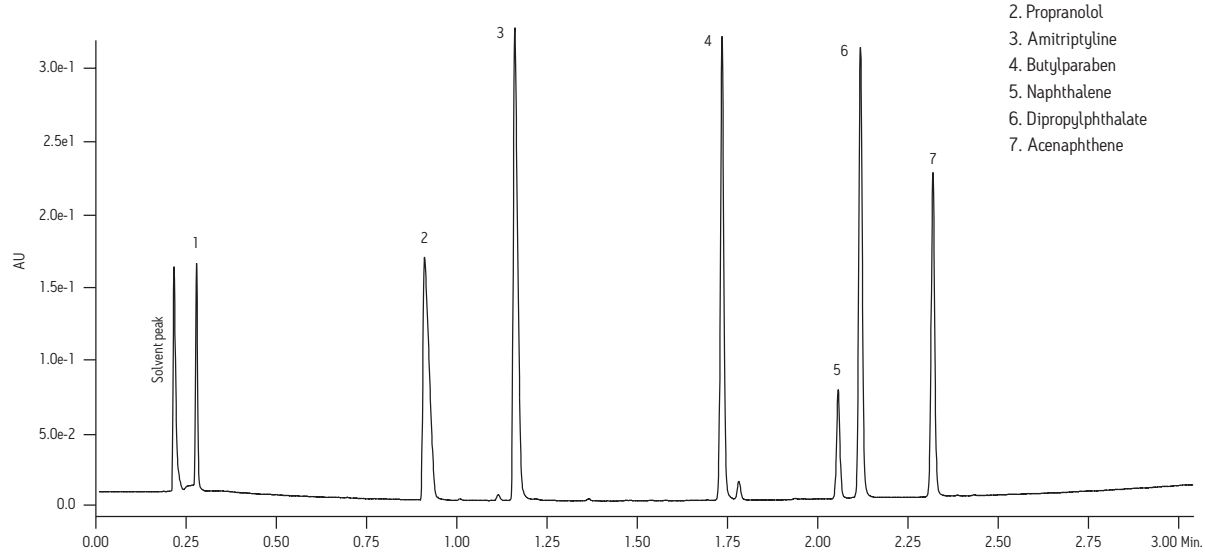
Naphthalene



Dipropylphthalate

Time (min)	Flow Rate (mL/min)	%A	%B	Curve
Initial	1.0	95	5	–
2.70	1.0	5	95	6
3.00	1.0	5	95	6
3.12	1.0	95	5	6
4.00	1.0	95	5	6

Reversed-Phase QCRM



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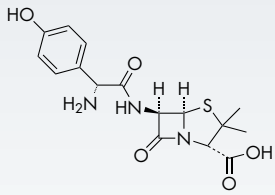
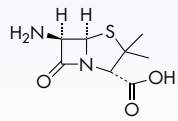
Analysis of Amoxicillin and Clavulanic Acid Oral Suspension using CORTECS UPLC 1.6 µm Columns

CONDITIONS

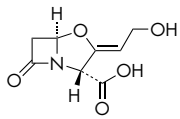
System:	ACQUITY UPLC® with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Separation mode:	Isocratic (92:8 mobile phase A:B)
Mobile phase A:	20 mM potassium phosphate buffer pH 5.2
Mobile phase B:	85:15 mobile phase A/acetonitrile
Detection:	UV at 230 nm
Flow rate:	0.4 mL/min
Injection volume:	2.0 µL
Column temp.:	30 °C
Sample diluent:	Water
Standards:	Prepared to listed concentrations
Sample preparation:	Amoxicillin suspension diluted with water. Sample filtered through a 0.2 µm filter.



Amoxicillin



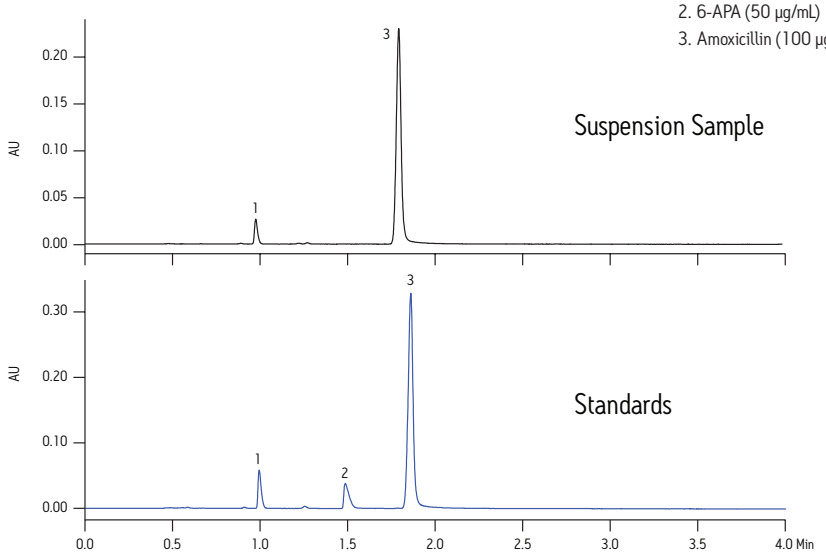
6-Aminopenicillanic acid



Clavulanic acid

Amoxicillin and Clavulanic Acid Oral Suspension

Compounds:
1. Clavulanic acid (100 µg/mL)
2. 6-APA (50 µg/mL)
3. Amoxicillin (100 µg/mL)



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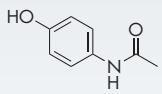
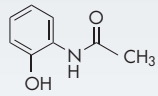
Analysis of Analgesics using CORTECS UPLC 1.6 µm Columns

CONDITIONS

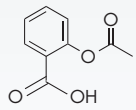
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 50 mm (p/n 186007093)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 260 nm
Gradient:	See table
Flow rate:	0.6 mL/min
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	Water



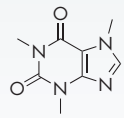
Acetaminophen



2-Acetamidophenol

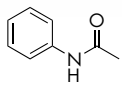


Acetylsalicylic acid



Caffeine

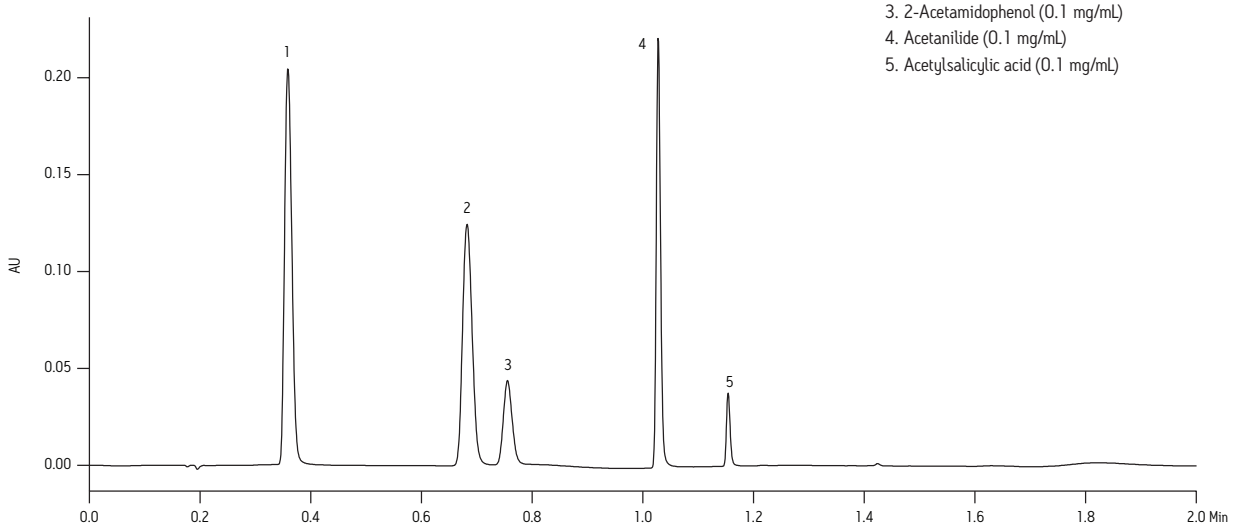
Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	90	10
0.5	0.6	90	10
1.2	0.6	50	50
1.5	0.6	90	10
3.0	0.6	90	10



Acetanilide

Analgesics

Compounds:
1. Acetaminophen (0.1 mg/mL)
2. Caffeine (0.1 mg/mL)
3. 2-Acetamidophenol (0.1 mg/mL)
4. Acetanilide (0.1 mg/mL)
5. Acetylsalicylic acid (0.1 mg/mL)



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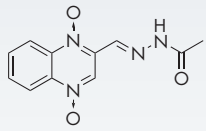
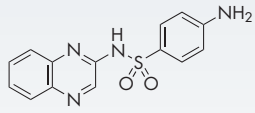
Analysis of Antibacterials using CORTECS UPLC 1.6 µm Columns

CONDITIONS

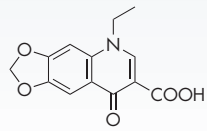
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 50 mm (p/n 186007093)
	Competitor Solid-Core C_{18}, 1.7 µm, 2.1 x 50 mm
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitile
Detection:	UV at 254 nm
Flow rate:	0.6 mL/min
Gradient:	See table
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	20% acetonitrile in water



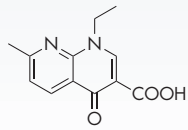
Carbadox



Sulfaquinoxaline



Oxolinic acid

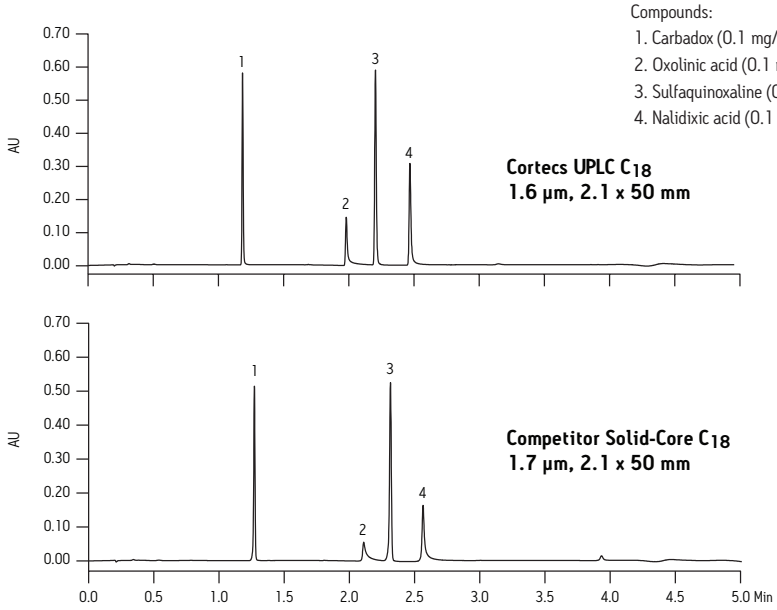


Nalidixic acid

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	95	5
4.0	0.6	50	50
4.1	0.6	95	5
5.0	0.6	95	5

Antibacterials

Compounds:
1. Carbadox (0.1 mg/mL)
2. Oxolinic acid (0.1 mg/mL)
3. Sulfaquinoxaline (0.1 mg/mL)
4. Nalidixic acid (0.1 mg/mL)



Comparative separations may not be representative in all applications.

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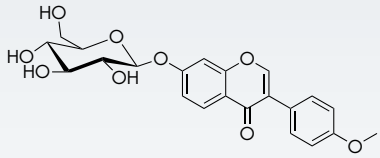
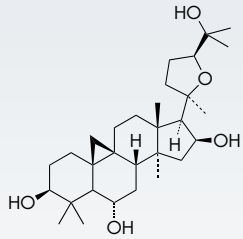
Analysis of *Astragalus* Root using CORTECS UPLC 1.6 µm Columns

CONDITIONS

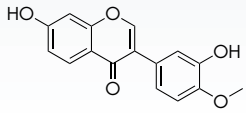
System:	ACQUITY UPLC® with Xevo® G2 QToF Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Mobile phase A:	Water with 0.1% formic acid
Mobile phase B:	Acetonitrile with 0.1% formic acid
Flow rate:	0.6 mL/min
Gradient:	2 to 98% B in 5.5 minutes
Run time:	7 minutes
Injection volume:	1 µL
Column temp.:	30 °C
Scan mode:	ESI+ 200–1000 amu
Cone voltage:	30 V
Desolvation gas:	800 L/hr
Desolvation temp.:	280 °C
Capillary voltage:	3 kV
Sample:	375 mg *Astragalus* root extracted with 4 mL 50:50 EtoAc/methanol
Identification:	Mass extracted from total ion chromatogram (TIC) and compounds identified by accurate mass using MassLynx® Software



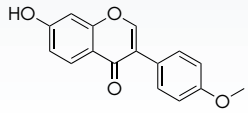
Ononin
$C_{22}H_{22}O_9$
430.40



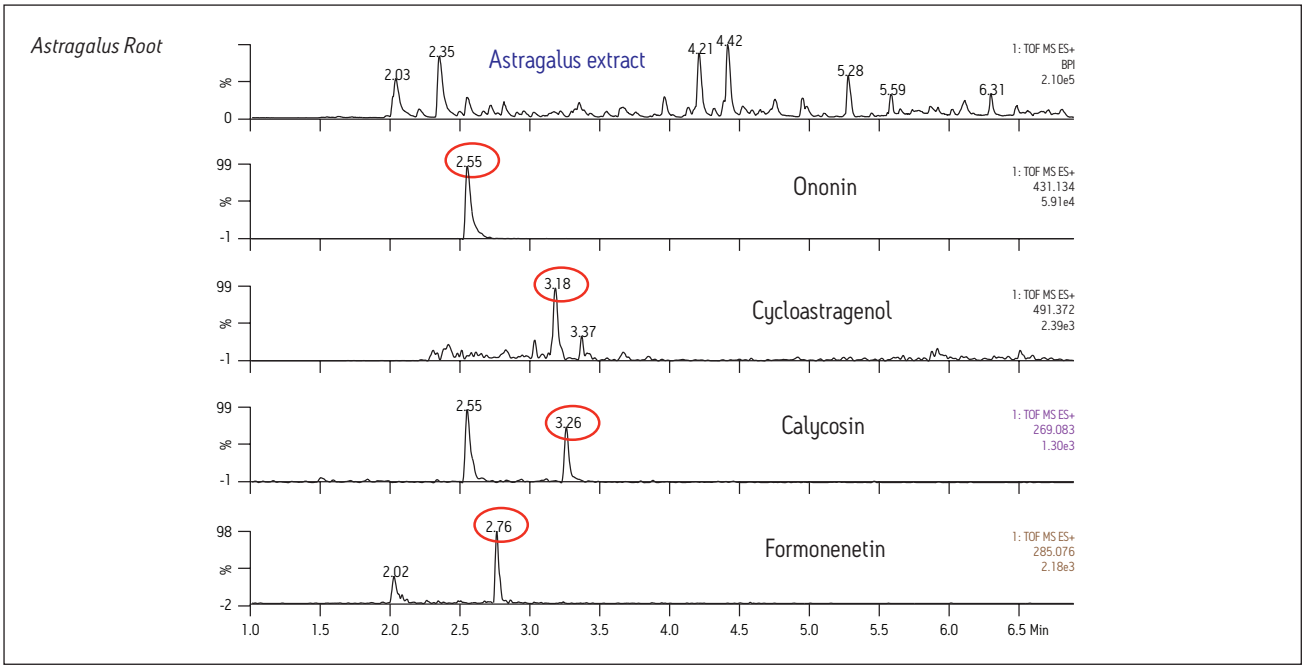
Cycloastragenol
$C_{30}H_{50}O_5$
490.72



Calycosin
$C_{16}H_{12}O_5$
284.26



Formononetin
$C_{16}H_{12}O_4$
268.26



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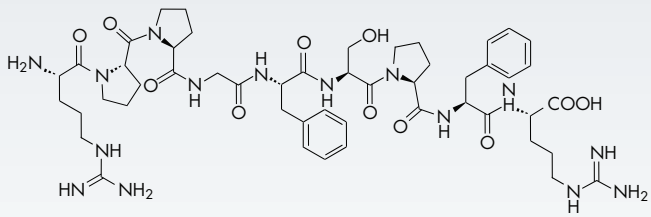
Quantitative SPE LC-MS/MS Assay for Bradykinin in Human Plasma using CORTECS UPLC 1.6 µm Column

CONDITIONS

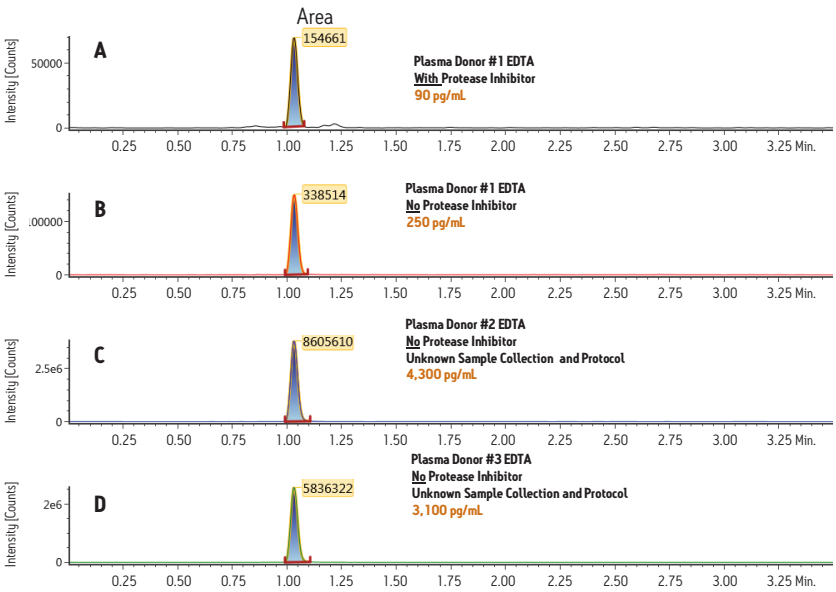
System:	ACQUITY UPLC® with a Xevo® TQ-S Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 mm x 50 mm
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Gradient:	see Table
Column temp.:	35 °C
Sample temp.:	15 °C
Inj. volume:	10 µL
Total run time:	3.5 minutes
Collection plates:	Waters 1 mL ACQUITY® Collection Plates
Ionization mode:	ESI positive
Capillary voltage:	3.0 kV
Desolvation temp.:	500 °C
Cone gas flow:	150 L/hr
Desolvation gas flow:	1000 L/hr



Bradykinin Amino Acid Sequence: RPPGFSPFR

Time (min)	Flow Rate (mL/min)	%A	%B	Curve
0.00	0.400	95.0	5.0	Initial
0.15	0.400	95.0	5.0	6
1.75	0.400	25.0	75.0	6
2.00	0.400	5.0	95.0	6
2.50	0.400	5.0	95.0	6
2.60	0.400	95.0	5.0	6
3.00	0.400	95.0	5.0	6

Endogenous levels of bradykinin extracted from human plasma



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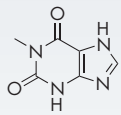
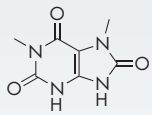
Analysis of Caffeine Metabolites using CORTECS UPLC 1.6 µm Columns

CONDITIONS

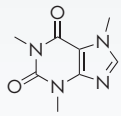
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 50 mm (p/n 186007093)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 280 nm
Gradient:	See table
Flow rate:	0.43 mL/min
Injection volume:	2.0 µL
Column temp.:	30 °C
Sample diluent:	Water



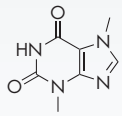
1-Methylxanthine



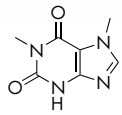
1,7-Dimethyluric acid



Caffeine



Theobromine

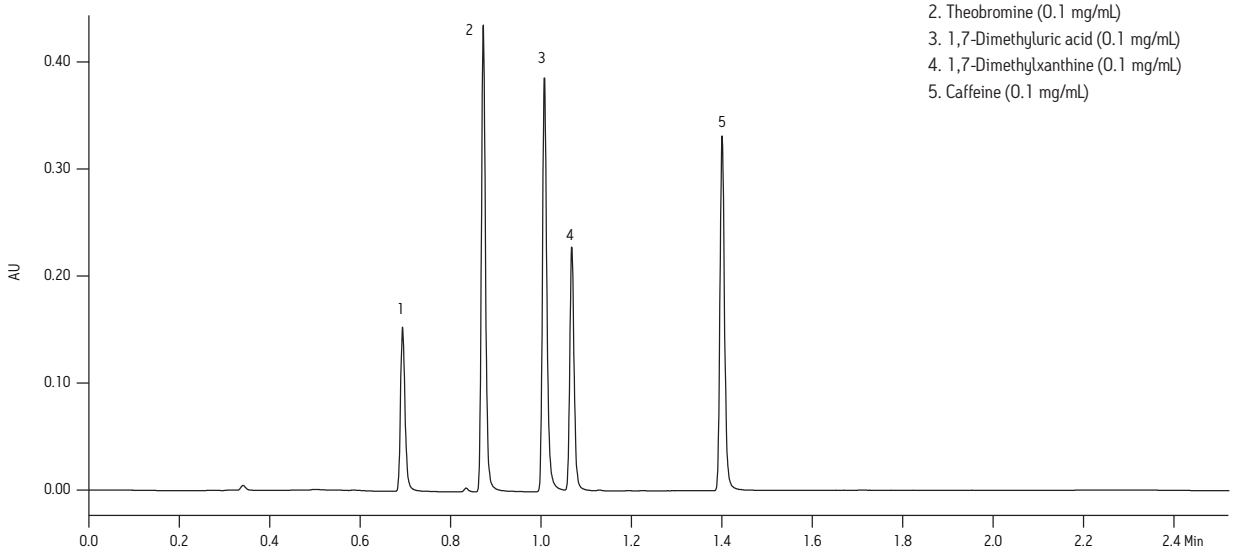


1,7-Dimethylxanthine

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	95	5
2.2	0.6	76	24
2.5	0.6	95	5
4.0	0.6	95	5

Caffeine Metabolites

Compounds:
1. 1-Methylxanthine (0.1 mg/mL)
2. Theobromine (0.1 mg/mL)
3. 1,7-Dimethyluric acid (0.1 mg/mL)
4. 1,7-Dimethylxanthine (0.1 mg/mL)
5. Caffeine (0.1 mg/mL)



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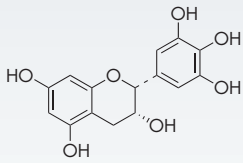
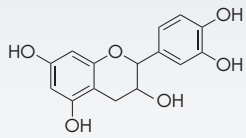
Analysis of Catechins and Green Tea using CORTECS UPLC 1.6 µm Columns

CONDITIONS

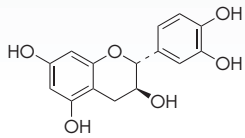
System:	ACQUITY UPLC® H-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Separation mode:	Isocratic
Mobile phase:	90:10 water/acetonitrile with 0.1% formic acid
Detection:	UV at 215 nm
Flow rate:	0.53 mL/min
Injection volume:	1.4 µL
Column temp.:	30 °C
Standards:	Prepared to 0.1 mg/mL in water
Sample:	0.2 g green tea extracted with 10 mL methanol and diluted using Milli-Q® water



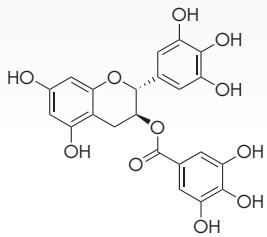
Epigallocatechin



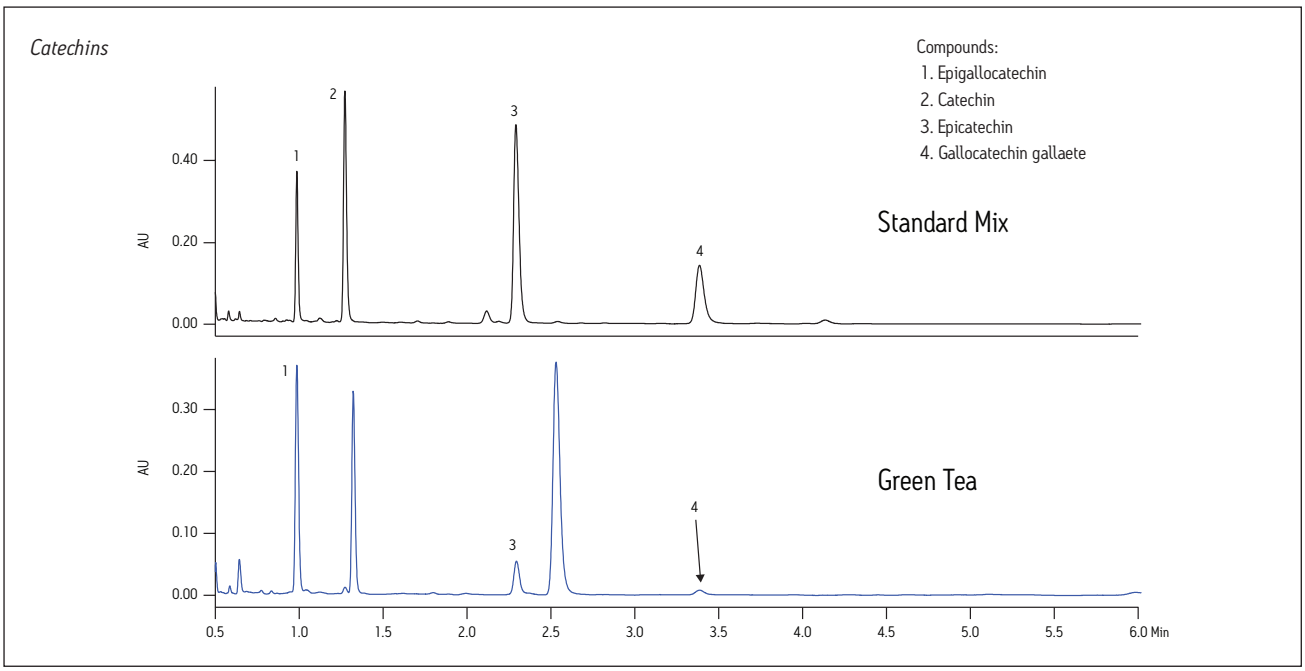
Epicatechin



Catechin



Gallocatechin gallate



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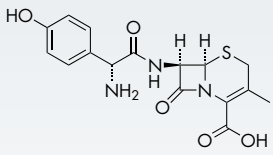
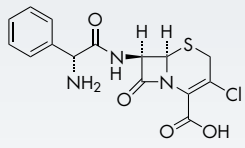
Analysis of Cephalosporins using CORTECS UPLC 1.6 µm Columns

CONDITIONS

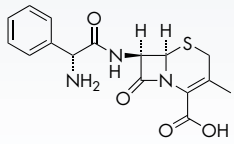
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 50 mm (p/n 186007093)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Flow rate:	0.5 mL/min
Gradient:	See table
Injection volume:	1.4 µL
Column temp.:	30 °C
Sample diluent:	Water



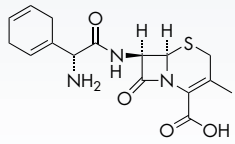
Cefadroxil



Cefaclor



Cephalexin

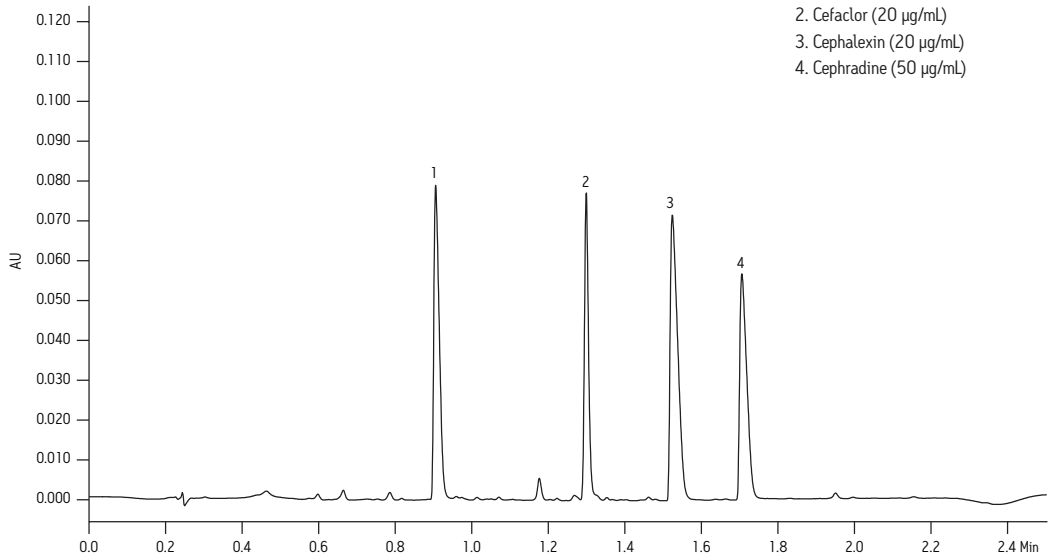


Cephradine

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.5	95	5
2.0	0.5	80	20
2.1	0.5	95	5
3.0	0.5	95	5

Cephalosporins

Compounds:
1. Cefadroxil (20 µg/mL)
2. Cefaclor (20 µg/mL)
3. Cephalexin (20 µg/mL)
4. Cephradine (50 µg/mL)



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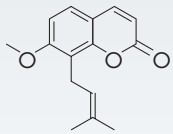
Analysis of *Cnidium Monnieri* using CORTECS UPLC 1.6 µm Columns

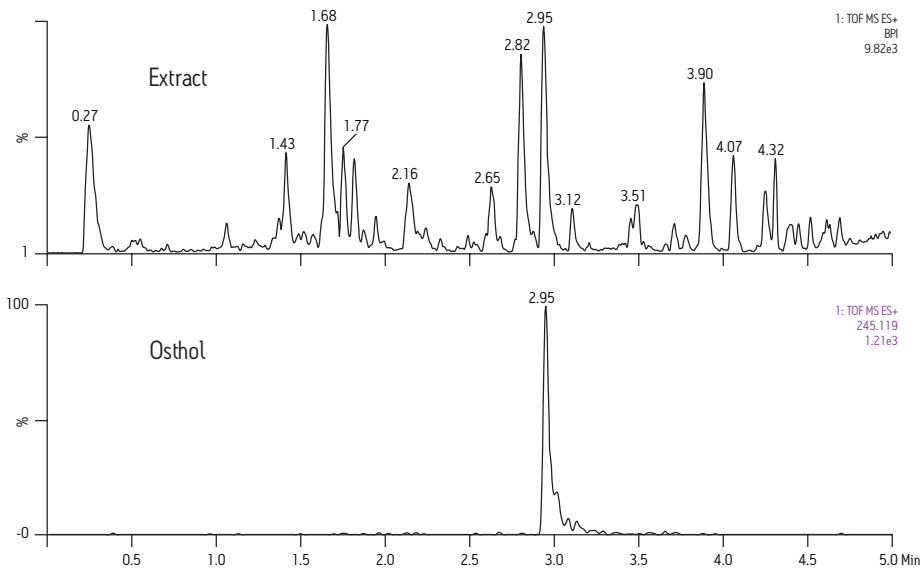
CONDITIONS

System:	ACQUITY UPLC® with Xevo® G2 QToF Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 50 mm (p/n 186007093)
Mobile phase A:	Water with 0.1% formic acid
Mobile phase B:	Acetonitrile with 0.1% formic acid
Flow rate:	0.6 mL/min
Gradient:	2 to 98% B in 5.5 minutes, hold 1 minute, equilibrate at 2% B
Run time:	7 minutes
Injection volume:	1 µL
Column temp.:	30 °C
Scan mode:	ESI+ 200–500 amu
Cone voltage:	30 V
Desolvation gas:	800 L/hr
Desolvation temp.:	280 °C
Capillary voltage:	3 kV
Sample:	600 mg *Cnidium Monnieri* extracted with 8 mL 50:50 EtoAc/methanol
Identification:	Mass extracted from total ion chromatogram (TIC) and compounds identified by accurate mass using MassLynx® Software



Osthol
mw 244.28
$C_{15}H_{16}O_3$

Cnidium Monnieri



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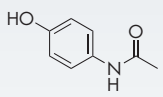
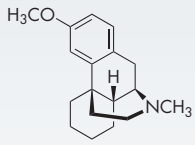
Analysis of Cold Medicine Compounds by Reversed-Phase LC using CORTECS UPLC 1.6 µm Columns

CONDITIONS

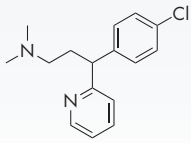
System:	ACQUITY UPLC® H-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Mobile phase A:	0.1% trifluoroacetic acid in water
Mobile phase B:	Acetonitrile
Detection:	UV at 265 nm
Flow rate:	0.6 mL/min
Gradient:	See table
Injection volume:	1.0 µL
Column temp.:	30 °C
Standards:	Prepared to listed concentrations in water
Sample:	1 mL cough syrup diluted to 10 mL with water



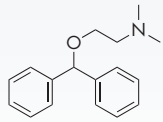
Acetaminophen



Dextromethorphan

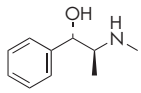


Chlorpheniramine



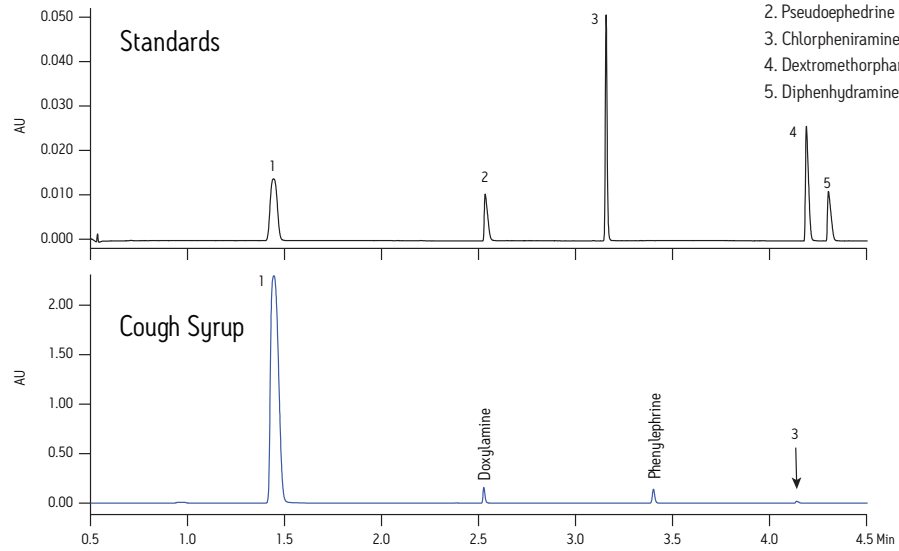
Diphenhydramine

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.5	95	5
0.5	0.5	95	5
4.0	0.5	52	48
4.5	0.5	52	48
4.6	0.5	95	5
6.0	0.5	95	5



Pseudoephedrine

Cold Medicine Compounds



Compounds:
1. Acetaminophen (10 µg/mL)
2. Pseudoephedrine (200 µg/mL)
3. Chlorpheniramine (100 µg/mL)
4. Dextromethorphan (100 µg/mL)
5. Diphenhydramine (100 µg/mL)

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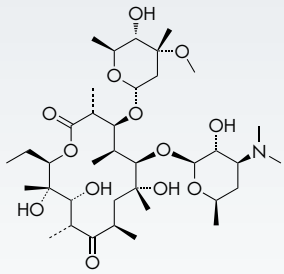
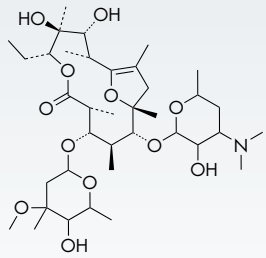
Analysis of Erythromycins from *Streptomyces* sp. using CORTECS UPLC 1.6 µm Columns

CONDITIONS

System:	ACQUITY UPLC® with Xevo® G2 QToF Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Mobile phase A:	Water with 0.1% formic acid
Mobile phase B:	Acetonitrile with 0.1% formic acid
Flow rate:	0.6 mL/min
Gradient:	2 to 98% B in 5.5 minutes, hold 1 minute, equilibrate at 2% B
Run time:	7 minutes
Injection volume:	1 µL
Column temp.:	30 °C
Scan mode:	ESI+ 200–1500 amu
Cone voltage:	30 V
Desolvation gas:	800 L/hr
Desolvation temp.:	280 °C
Capillary voltage:	3 kV
Sample:	10 mL *Streptomyces* sp. fermentation broth extracted with 10 mL 80:20 EtoAc/methanol

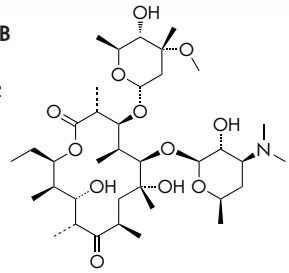


Erythromycin A
mw 733.93
$C_{37}H_{67}NO_{13}$



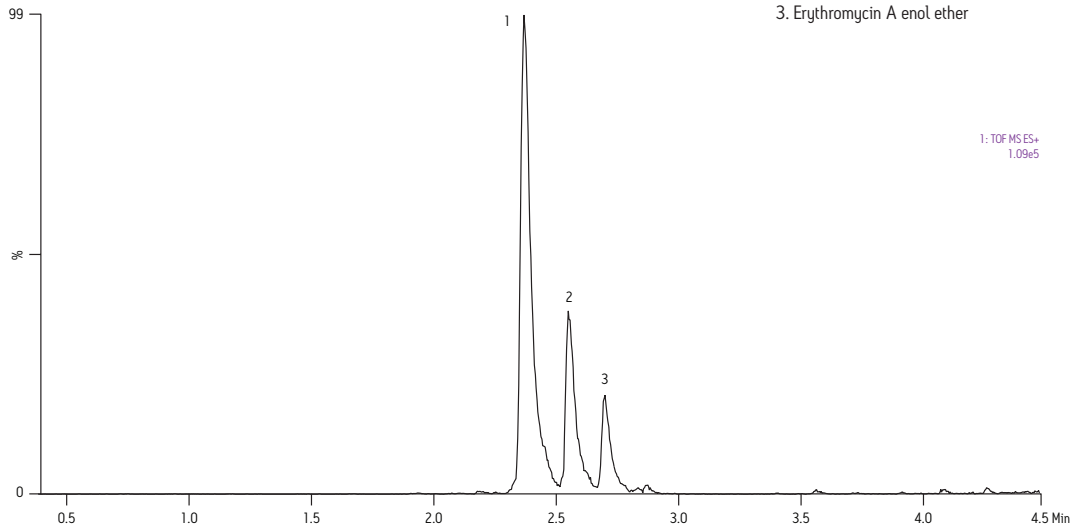
Erythromycin A enol ether
mw 715.91
$C_{37}H_{65}NO_{12}$

Erythromycin B
mw 717.93
$C_{37}H_{67}NO_{12}$



Erythromycins from Streptomyces sp.

Compounds:
1. Erythromycin A
2. Erythromycin B
3. Erythromycin A enol ether



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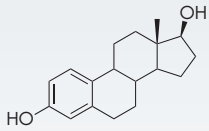
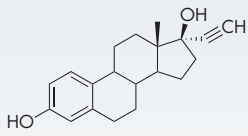
Analysis of Estradiols using CORTECS UPLC 1.6 µm Columns

CONDITIONS

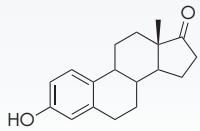
System:	ACQUITY UPLC® H-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Separation mode:	Isocratic
Mobile phase:	45:55 water/acetonitrile with 0.1% formic acid
Flow rate:	0.61 mL/min
Detection:	UV at 220 nm
Injection volume:	1.4 µL
Column temp.:	30 °C
Standards:	Prepared to 20 µg/mL in 50% acetonitrile in water
Sample:	1 birth control tablet dissolved into 1 mL of water, filtered through 0.2 µm filter



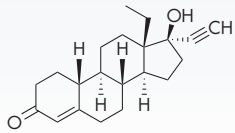
Estradiol



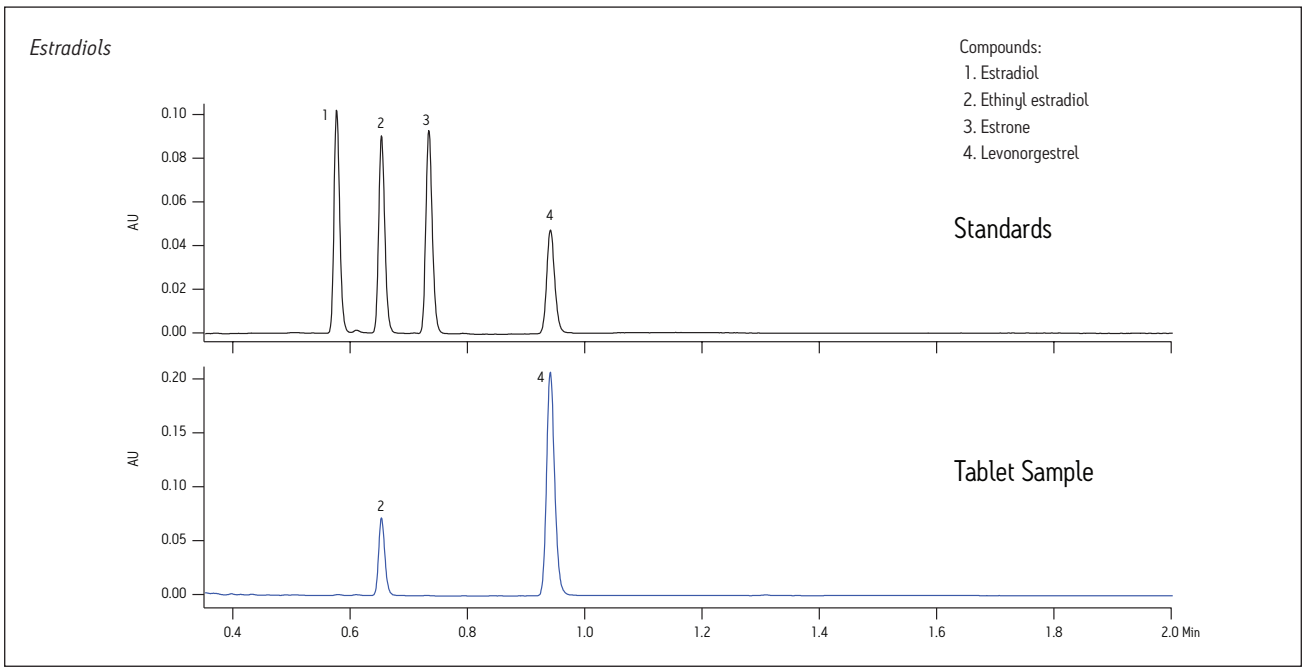
Ethinyl estradiol



Estrone



Levonorgestrel



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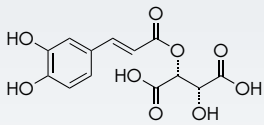
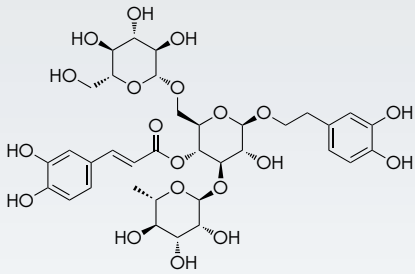
Analysis of Phenolics in Echinacea using CORTECS UPLC 1.6 µm Columns

CONDITIONS

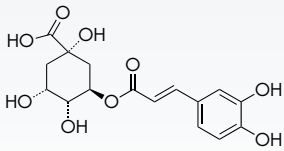
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 50 mm (p/n 186007093)
Mobile phase A:	0.1% trifluoroacetic acid in water
Mobile phase B:	Acetonitrile
Detection:	UV at 330 nm
Flow rate:	0.5 mL/min
Gradient:	See table
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	Water



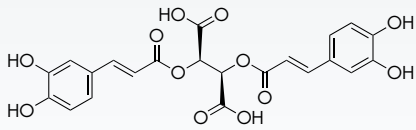
Caftaric Acid



Echinacoside

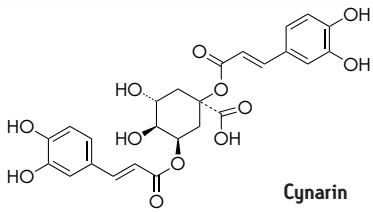


Chlorogenic acid



Cichoric acid

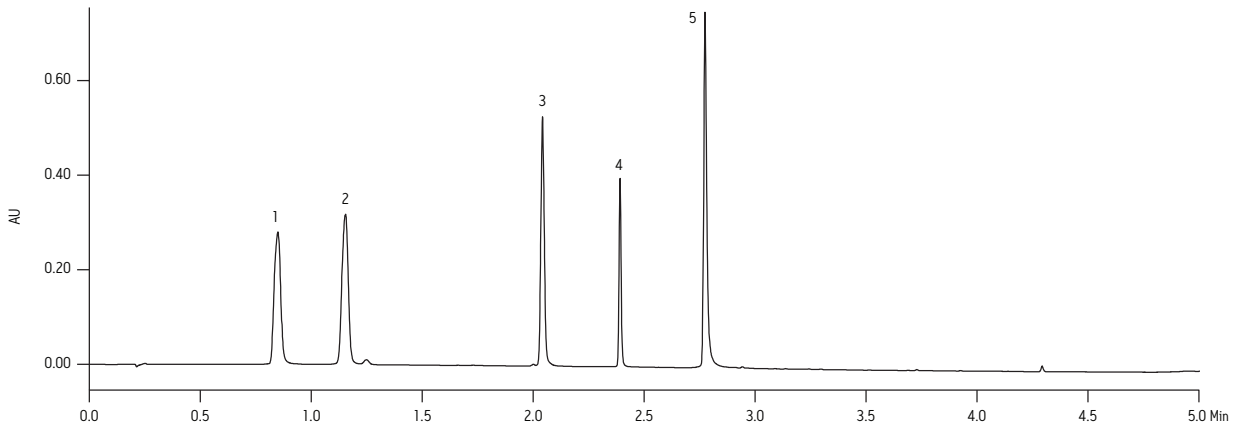
Time (min)	%A	%B	Curve
Initial	92	8	–
0.10	92	8	6
4.45	50	50	7
4.86	10	90	6
5.00	92	8	6
6.00	92	8	6



Cynarin

Phenolics in Echinacea

Compounds:
1. Caftaric acid (100 µg/mL)
2. Chlorogenic Acid (100 µg/mL)
3. Cynarin (100 µg/mL)
4. Echinacoside (100 µg/mL)
5. Cichoric acid (100 µg/mL)



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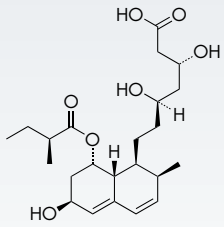
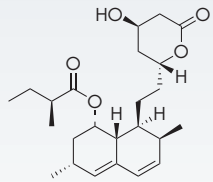
Analysis of Statins using CORTECS UPLC 1.6 µm Columns

CONDITIONS

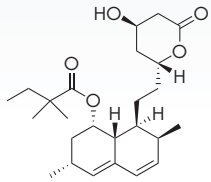
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 50 mm (p/n 186007093)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 248 nm
Gradient:	See table
Flow rate:	0.6 mL/min
Injection volume:	2.0 µL
Column temp.:	30 °C
Sample diluent:	50:50 methanol/water



Pravastatin

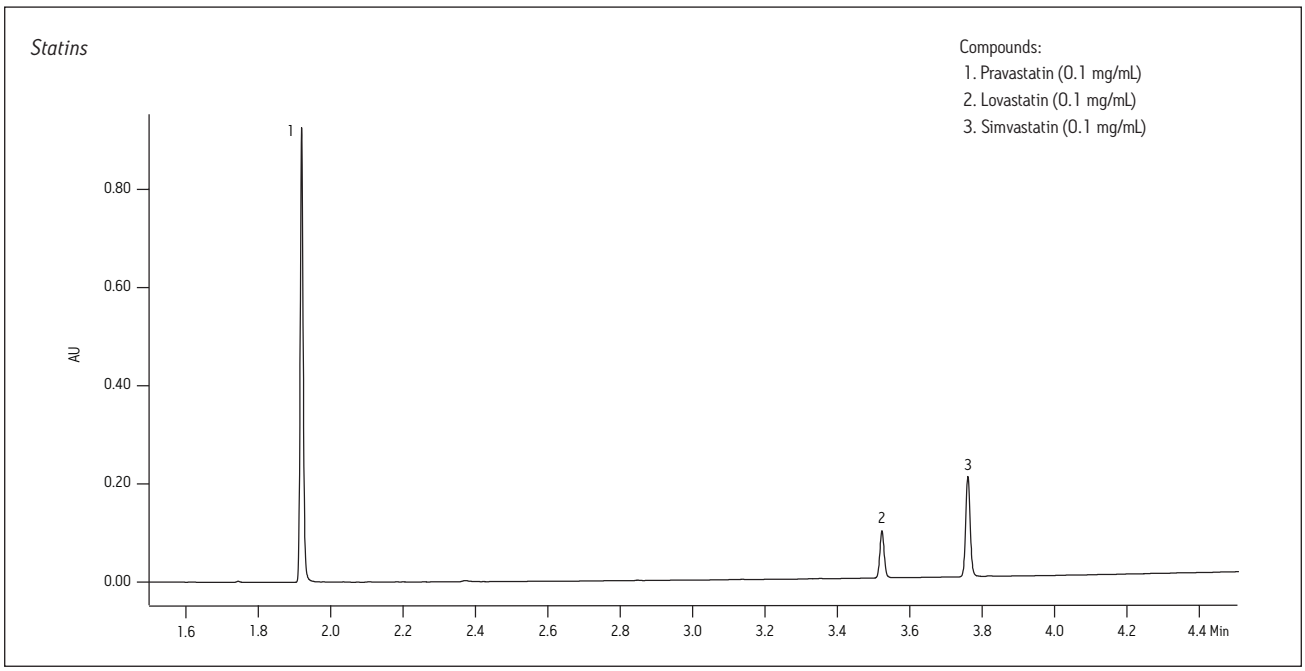


Lovastatin



Simvastatin

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	95	5
5.0	0.6	5	95
5.1	0.6	95	5
6.0	0.6	95	5



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Analysis of Synthetic Cannabinoids from Urine using CORTECS UPLC 1.6 µm Columns

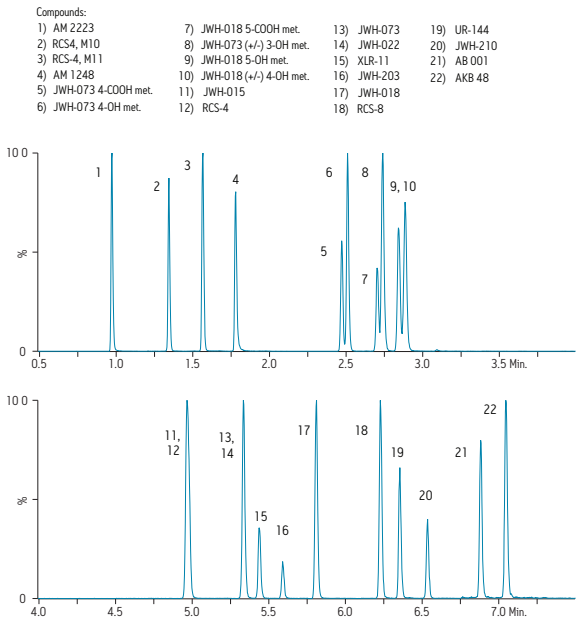
CONDITIONS

System:	ACQUITY UPLC® I-Class with Xevo® TQD Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Column temp.:	30 °C
Injection volume:	5 µL
Flow rate:	0.6 mL/min.
Mobile phase A:	0.1% formic acid in Milli-Q® water
Mobile phase B:	0.1% formic acid in acetonitrile
Vials/plates:	96-well collection plates with 700 µL deactivated glass inserts (p/n 186000349DV)

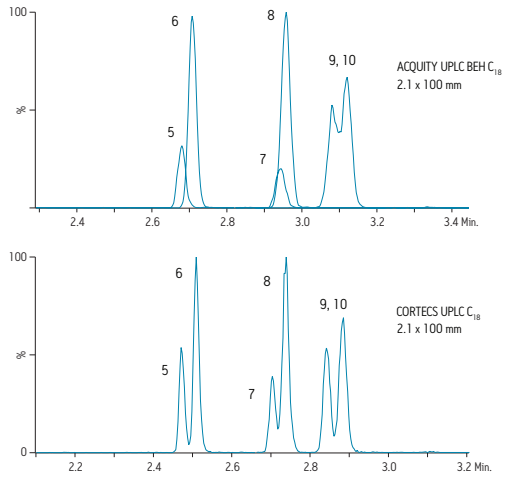
Time (min)	%A	%B	Curve
Initial	70	30	–
2.0	50	50	6
3.0	50	50	6
7.0	10	90	6
7.2	70	30	6
8.5	70	30	6

To see the full application note, visit www.waters.com and search for literature code: 720004780EN

Calibration Standard at 20 ng/mL



Peaks 5–10 by C_{18}



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Analysis of Synthetic Cannabinoids from Whole Blood using CORTECS UPLC 1.6 µm Columns

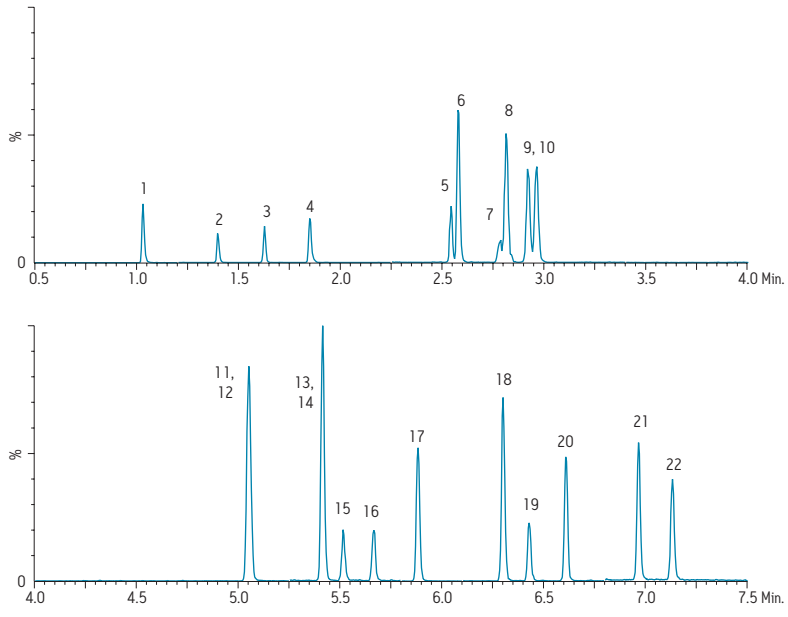
CONDITIONS

System:	ACQUITY UPLC® and ACQUITY® TQD Mass Spectrometer
Column:	CORTECS® UPLC® C_{18}, 1.6 µm, 2.1 x 100 mm (p/n 186007095)
Column temp.:	30 °C
Injection volume:	10 µL
Flow rate:	0.6 mL/min
Mobile phase A:	0.1% formic acid in Milli-Q® water
Mobile phase B:	0.1% formic acid in acetonitrile
Vials/plates:	Ostro™ 96-well sample collection plates, 2.0 mL (p/n 186005518)

Time (min)	%A	%B	Curve
Initial	70	30	–
2.0	50	50	6
3.0	50	50	6
7.0	10	90	6
7.2	70	30	6
8.0	70	30	6

To see the full application note, visit www.waters.com and search for literature code: 720004726EN

Calibration Standard at 20 ng/mL



Compounds:

1. AM 2223
2. RCS4, M10
3. RCS-4, M11
4. AM 1248
5. JWH-073 4-butanoic acid met
6. JWH-073 4-hydroxybutyl met
7. JWH-018 5-pentanoic acid met
8. JWH-073 (+/-) 3-hydroxybutyl met
9. JWH-018 5-hydroxypentyl met
10. JWH-018 (+/-) 4-hydroxypentyl met
11. JWH-015
12. RCS-4
13. JWH-073
14. JWH-022
15. XLR-11
16. JWH-203
17. JWH-018
18. RCS-8
19. UR-144
20. JWH-210
21. AB 001
22. AKB 48

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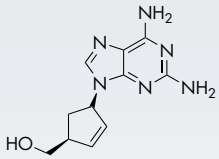
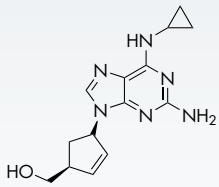
Analysis of Abacavir Related Compounds using CORTECS 2.7 µm Columns

CONDITIONS

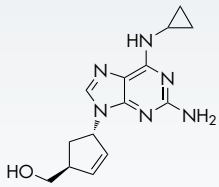
System:	Alliance® HPLC with 2998 Photodiode Array Detector
Column:	Fully-Porous C_{18}, 5 µm, 4.6 x 150 mm
	CORTECS® C_{18}, 2.7 µm, 4.6 x 75 mm (p/n 186007376)
Mobile phase A:	0.1% trifluoroacetic acid in water
Mobile phase B:	85% methanol in water
Detection:	UV at 254 nm
Gradient:	See table
Column temp.:	30 °C
Sample:	Abacavir USP Related Compounds
Sample diluent:	Water



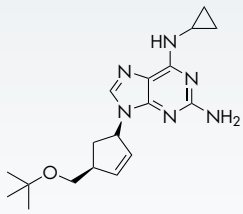
1. Descycleopropylabacavir



2. Abacavir

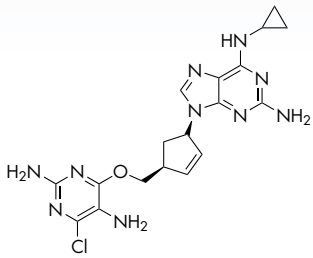


3. 1R,4R Trans abacavir



5. O-t-Butyl-abacavir

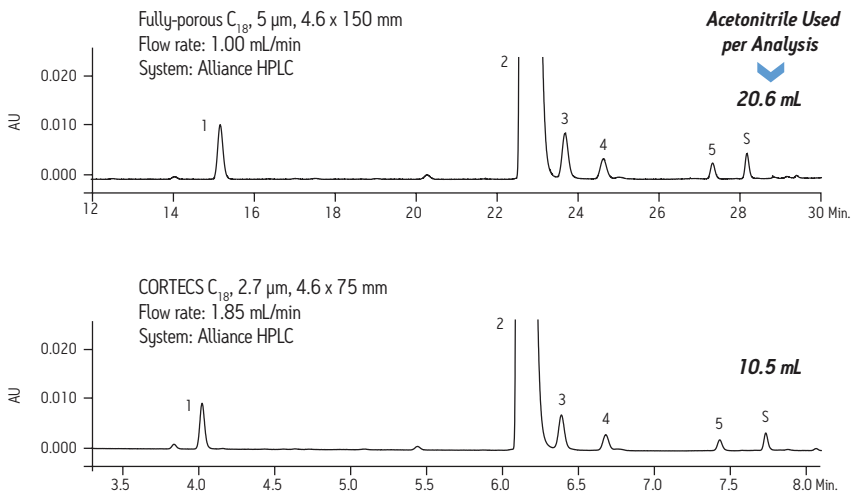
Gradient Time (min)					
4.6 x 150 mm	4.6 x 75 mm	2.1 x 50 mm	%A	%B	Curve
Initial	Initial	Initial	95	5	–
23.64	6.38	2.52	70	30	6
38.39	10.37	4.09	10	90	11
43.83	11.83	4.68	10	90	11
44.89	12.12	4.69	95	5	11



4. O-(4-Chloro-2,5-diaminopyrimidnyl)-abacavir

Abacavir Related Compounds

Compounds:
1. Descycleopropylabacavir
2. Abacavir
3. 1R,4R Trans abacavir
4. O-(4-Chloro-2,5-diaminopyrimidnyl)-abacavir
5. O-t-Butyl-abacavir
s. Solvent peak



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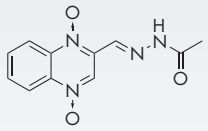
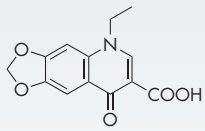
Fast Analysis of Antibacterials using CORTECS 2.7 µm Columns

CONDITIONS

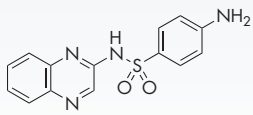
System:	ACQUITY UPLC® H-Class System with ACQUITY® PDA Detector
Column:	CORTECS® C_{18}, 2.7 µm, 4.6 x 50 mm (p/n 186007375)
	Fully Porous C_{18}, 5 µm, 4.6 x 100 mm
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV at 254 nm
Gradient:	Linear from 5–50% B
Column temp.:	30 °C
Sample diluent:	20% acetonitrile in water



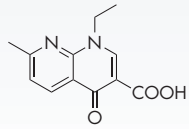
Carbadox



Oxolinic acid

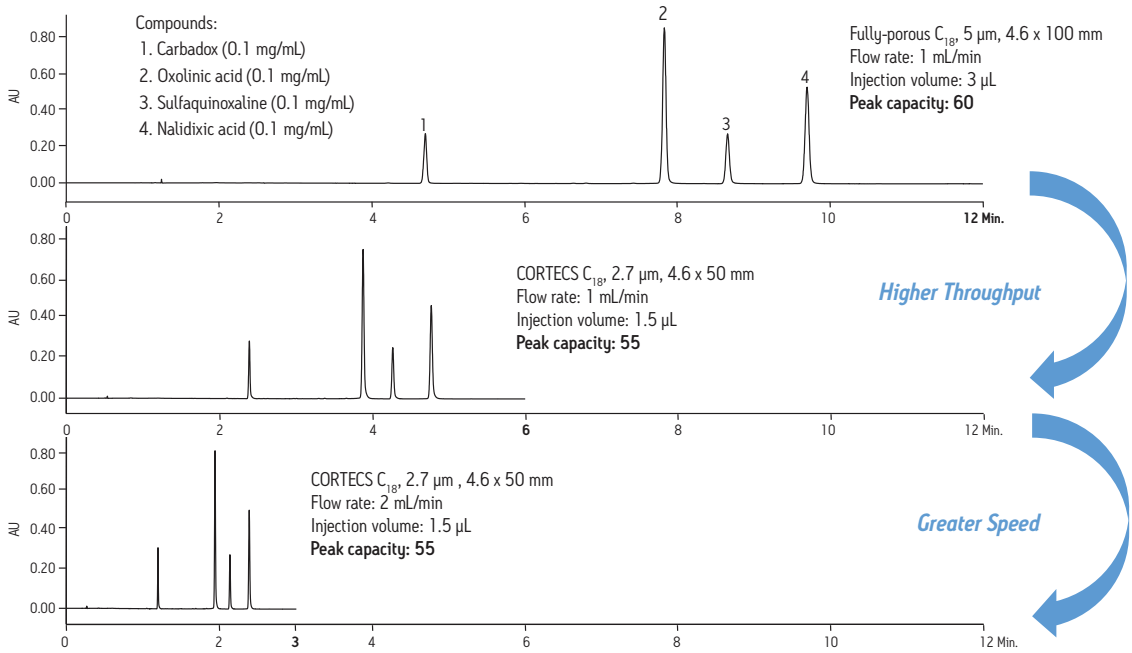


Sulfaquinoxaline



Nalidixic acid

Antibacterials



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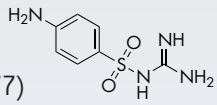
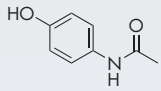
Analysis of LCMS Quality Control Reference Material (QCRM) using CORTECS 2.7 µm Columns

CONDITIONS

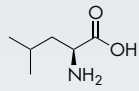
System:	ACQUITY UPLC® with TQD Mass Spectrometer
Column:	CORTECS® C_{18}, 2.7 µm, 4.6 x 100 mm (p/n 186007377)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Flow rate:	2.0 mL/min
Gradient:	See table
Injection volume:	9.6 µL
Column temp.:	40 °C
Sample:	LCMS QCRM (p/n 186006963)
Capillary voltage:	3.8 kV
Cone voltage:	30 V
Extractor:	3 V
RF lens:	0.0 V
Ion energy:	0.5
Source temp:	120 °C
Desolvation temp:	450 °C
Desolvation flow:	1000 L/hr
Cone flow:	30 L/hr



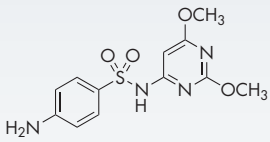
Sulfaguanidine



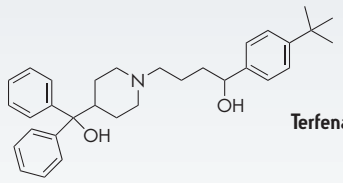
Acetaminophen



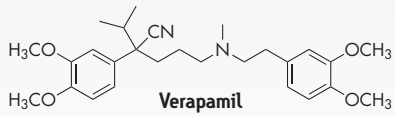
L-leucine



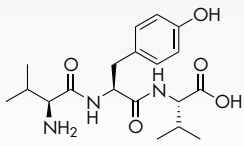
Sulfadimethoxine



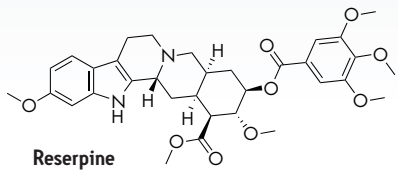
Terfenadine



Verapamil



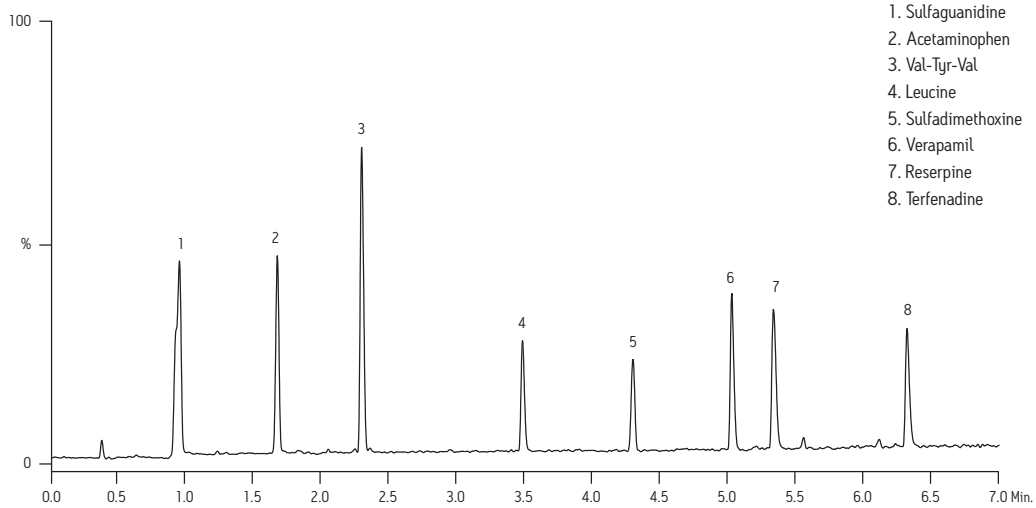
Val-Tyr-Val



Reserpine

Time (min)	Flow Rate (mL/min)	%A	%B	Curve
0.00	2.0	95	5	–
9.60	2.0	25	75	6
10.0	2.0	25	75	6
10.1	2.0	75	25	6
12.0	2.0	75	25	6

LCMS QCRM



Compounds:
1. Sulfaguanidine
2. Acetaminophen
3. Val-Tyr-Val
4. Leucine
5. Sulfadimethoxine
6. Verapamil
7. Reserpine
8. Terfenadine

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Analysis of Sudan Dyes using CORTECS 2.7 µm Columns

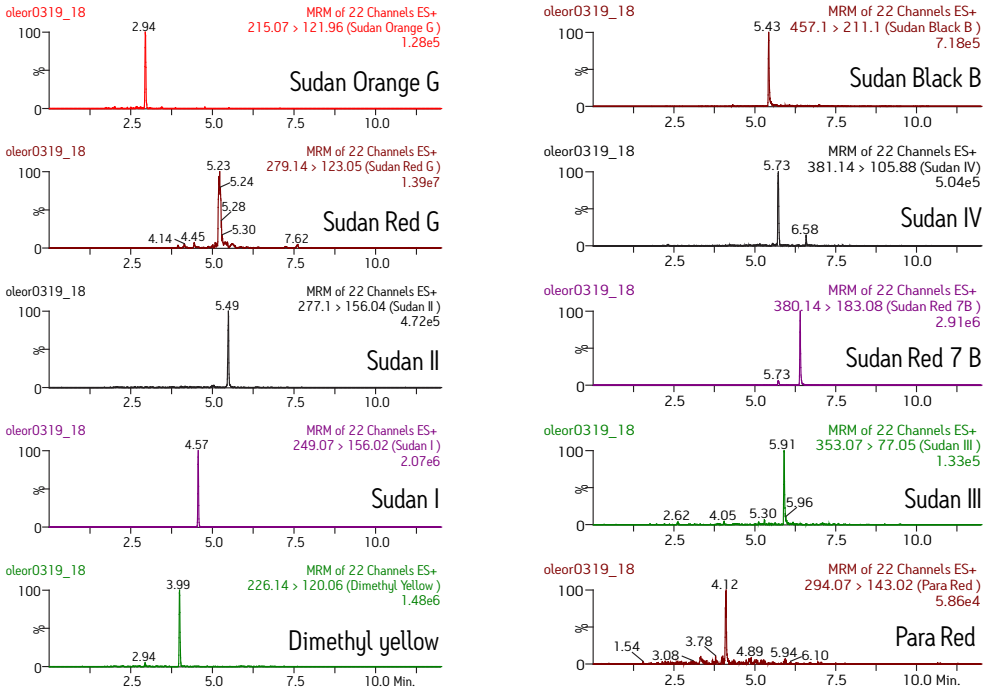
CONDITIONS

System:	ACQUITY UPLC® H-Class with Xevo® TQD Mass Spectrometer
Column:	CORTECS® C_{18}, 2.7 µm, 2.1 x 100 mm (p/n 186007367)
Mobile phase A:	Water + 0.1% formic acid
Mobile phase B:	Methanol + 0.1% formic acid
Mobile phase C:	Acetonitrile + 0.1% formic acid
Flow rate:	0.4 mL/min
Gradient:	See table
Injection volume:	5 µL
Column temp.:	45 °C
Sample:	Sudan Dyes in Oleoresin
Sample preparation	Oleoresin prepared using Certified Sep-Pak® Silica 3 cc Vac Cartridge, 500 mg sorbent per cartridge, 55–105 µm particle Size) (p/n 186004615)
Ionization mode:	ESI+

Capillary voltage:	1.5 kV
Desolvation temp.:	500 °C
Desolvation gas flow:	1000 L/Hr
Source temp.:	150 °C

Time (min)	Flow Rate (mL/min)	%A	%B	%C	Curve
Initial	0.4	80	10	10	–
0.5	0.4	40	30	30	6
5.0	0.4	0	50	50	6
9.0	0.4	0	50	50	6
9.1	0.4	80	10	10	6
12.0	0.4	80	10	10	6

100ppb Spiked Sudan Dyes in Oleoresin



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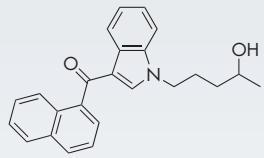
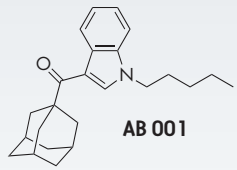
Analysis of Synthetic Cannabinoids using CORTECS 2.7 µm Columns

CONDITIONS

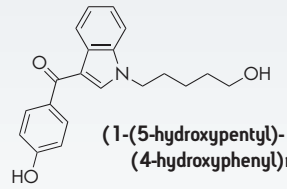
System:	ACQUITY UPLC® I-Class System (SM-FL), Column Manager (CMA) with Xevo® TQD Mass Spectrometer
Column:	CORTECS® C_{18}, 2.7 µm, 2.1 x 100 mm (p/n 186007367)
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Gradient:	See table
Injection volume:	5 µL
Column temp.:	30 °C
Sample:	Synthetic Cannabinoid Mix
Challenge Sample:	Prepared plasma using Ostro™ Sample Preparation Plate (p/n 186005518)



(1-(4-hydroxypentyl)-1 H-indol-3-yl) (naphthalen-1-yl)methanone



AB 001

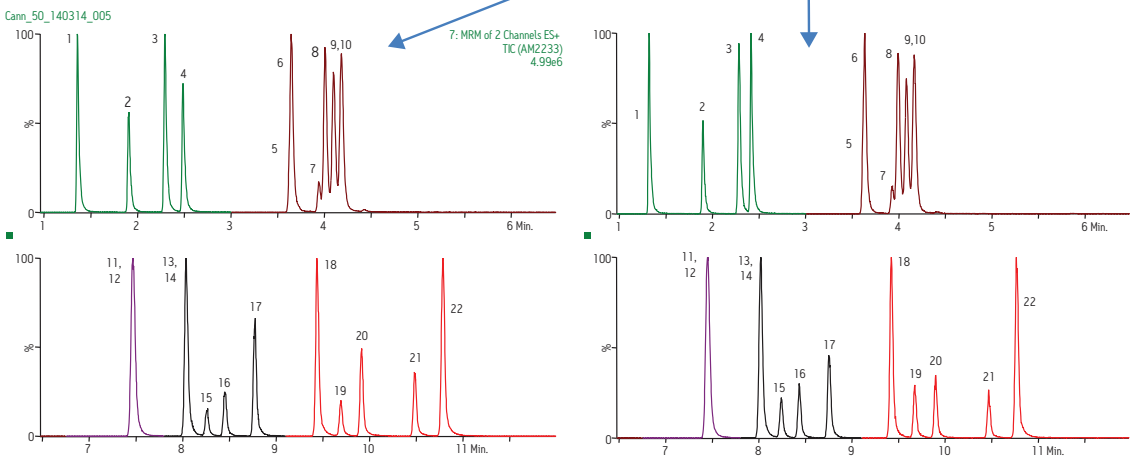


(1-(5-hydroxypentyl)-1H-indol-3-yl) (4-hydroxyphenyl)methanone

Time (min)	%A	%B	Curve
Initial	70	30	–
3.0	50	50	6
4.5	50	50	6
10.5	10	90	6
13.0	10	90	6
13.1	70	30	11
15.0	70	30	11

Synthetic Cannabinoids

		Retention Time	
Peak	Compound	Initial Injection	Injection 1000
2	RCS-4, M10	1.91	1.90
10	JWH-018, 4-OH met.	4.18	4.18
21	AB 001	10.49	10.48
Pressure		3753	3749



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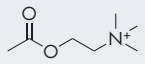
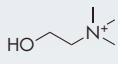
Quantification of Acetylcholine, Histamine, and their Metabolites in Human Cerebrospinal Fluid (CSF) using CORTECS UPLC 1.6 µm Columns

CONDITIONS

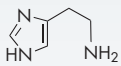
System:	ACQUITY UPLC® with Xevo® TQ-S Mass Spectrometer
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 100 mm (p/n 186007106)
Mobile phase A:	100 mM ammonium formate, pH 3
Mobile phase B:	Acetonitrile
Flow rate:	0.5 mL/min
Column temp.:	45 °C
Sample temp.:	6 °C
Injection volume:	10 µL
Collection plates:	Waters® ACQUITY® 1-mL collection plates



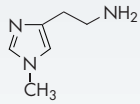
Acetylcholine (ACh)



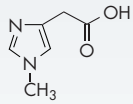
Choline (Ch)



Histamine (HA)



tele-Methylhistamine (t-mHA)

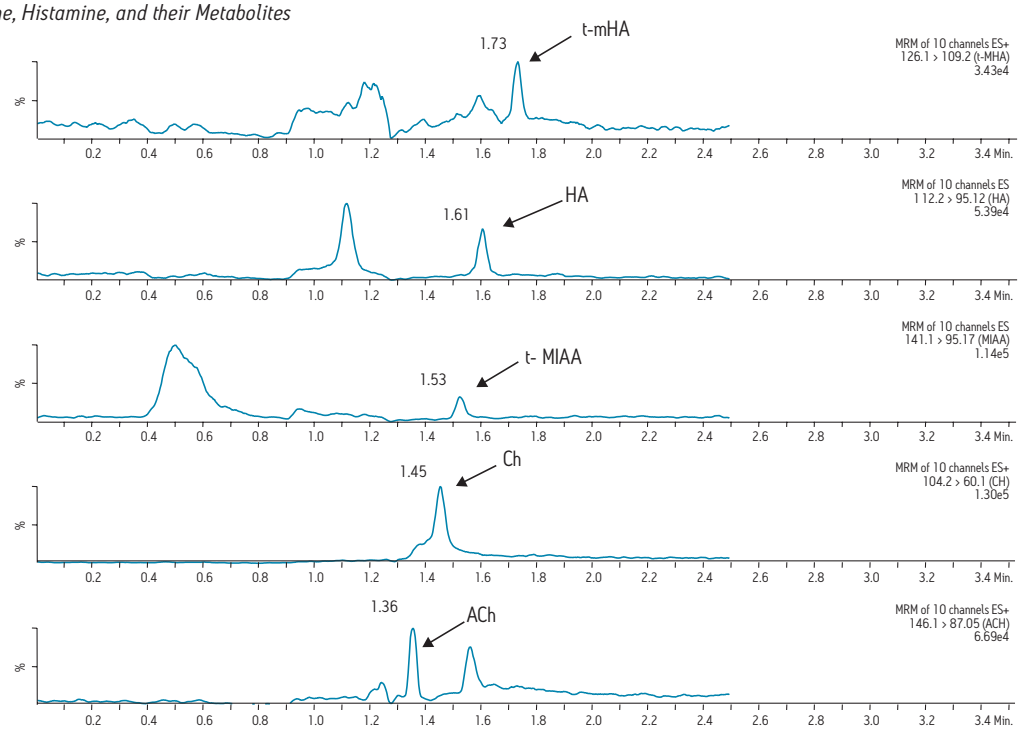


tele-Methyimidazoleacetic acid (t-MIAA)

Time (min)	Flow Rate (mL/min)	%A	%B	Curve
Initial	10	90	–	–
0.75	40	60	6	6
1.00	40	60	6	6
1.25	70	30	6	6
1.90	10	90	11	6

To see the full application note, visit www.waters.com and search for literature code: 720004722EN

Acetylcholine, Histamine, and their Metabolites



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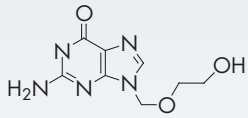
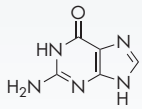
Analysis of Acyclovir and Guanine using CORTECS UPLC 1.6 µm Columns

CONDITIONS

System:	ACQUITY UPLC® with ACQUITY® PDA
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 100 mm (p/n 186007106)
Separation mode:	Isocratic (15:85 mobile phase A:B)
Mobile phase A:	0.2% formic acid in water
Mobile phase B:	0.2% formic acid in acetonitrile
Detection:	UV at 254 nm
Flow rate:	0.6 mL/min
Injection volume:	0.4 µL
Column temp.:	30 °C
Sample diluent:	0.02 N sodium hydroxide in 60:40 acetonitrile/water



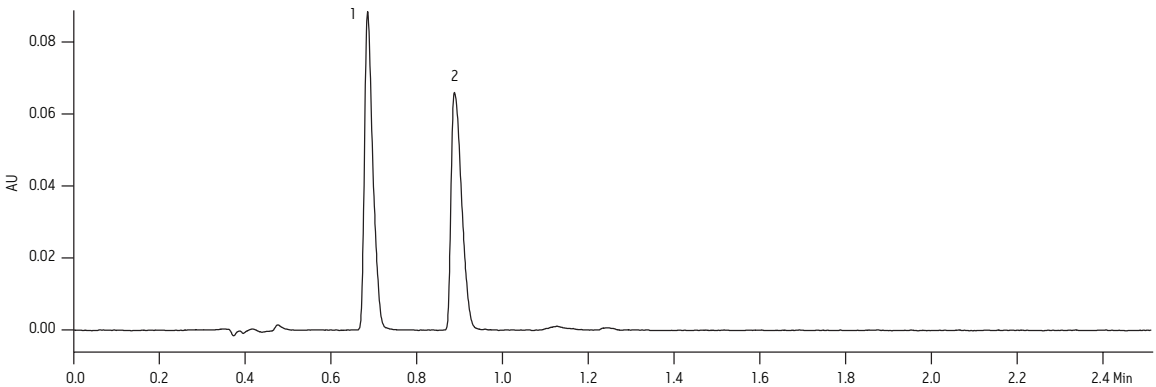
Acyclovir



Guanine

Acyclovir and Guanine

Compounds:
1. Acyclovir (50 µg/mL)
2. Guanine (50 µg/mL)



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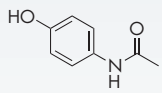
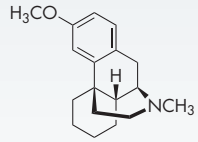
Analysis of Cold Medicine Compounds by HILIC using CORTECS UPLC 1.6 µm Columns

CONDITIONS

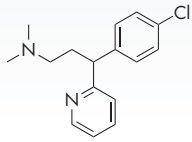
System:	ACQUITY UPLC® H-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 100 mm (p/n 186007106)
Mobile phase A:	50:50 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Mobile phase B:	90:10 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Detection:	UV at 265 nm
Flow rate:	0.6 mL/min
Gradient:	See table
Injection volume:	1.0 µL
Column temp.:	30 °C
Sample diluent:	75:25 acetonitrile/methanol with 0.2% formic acid



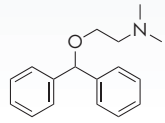
Acetaminophen



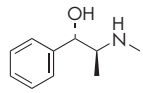
Dextromethorphan



Chlorpheniramine



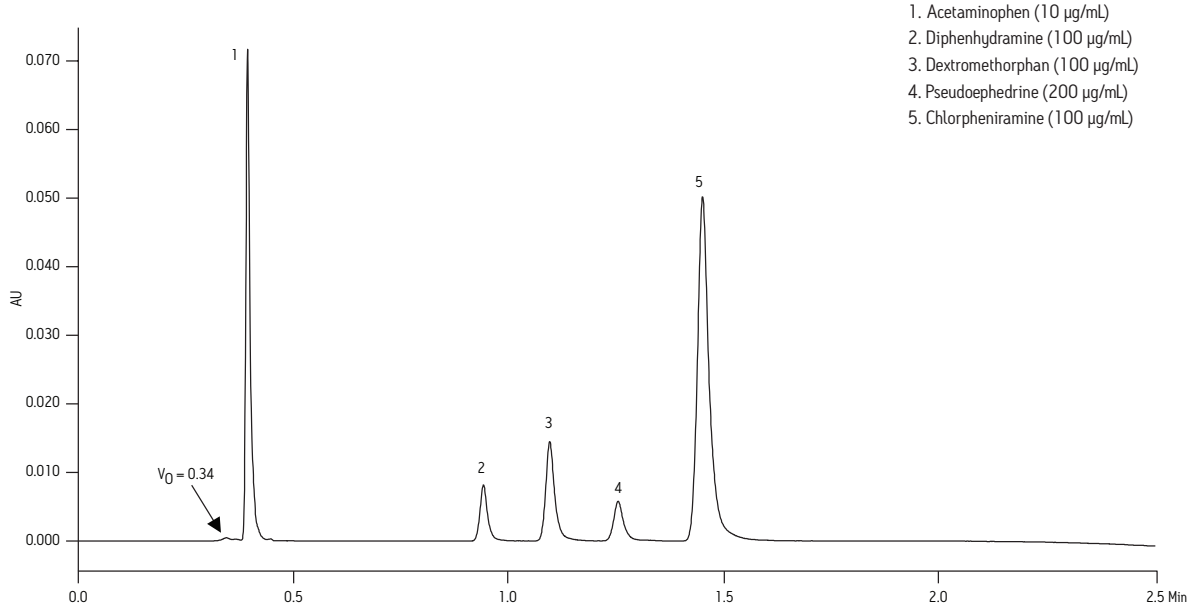
Diphenhydramine



Pseudoephedrine

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.6	0.1	99.9
1.0	0.6	0.1	99.9
2.6	0.6	99.9	0.1
2.7	0.6	0.1	99.9
3.5	0.6	0.1	99.9

Cold Medicine Compounds



Compounds:
1. Acetaminophen (10 µg/mL)
2. Diphenhydramine (100 µg/mL)
3. Dextromethorphan (100 µg/mL)
4. Pseudoephedrine (200 µg/mL)
5. Chlorpheniramine (100 µg/mL)

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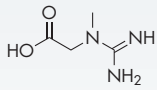
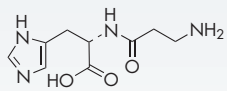
Analysis of Histidine Dipeptides using CORTECS UPLC 1.6 µm Columns

CONDITIONS

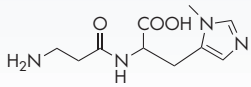
System:	ACQUITY UPLC® H-Class with Xevo® TQD Mass Spectrometer
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 50 mm (p/n 186007104)
Mobile phase A:	50:50 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Mobile phase B:	95:5 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Detection:	ESI+, scan m/z 100–300
Flow rate:	0.5 mL/min
Gradient:	See table
Capillary voltage:	1 kV
Cone voltage:	30 V
Desolvation gas:	800 L/hr
Desolvation temp.:	300 °C
Injection volume:	5.0 µL
Sample diluent:	75:25 acetonitrile/methanol with 0.2% formic acid



Creatine



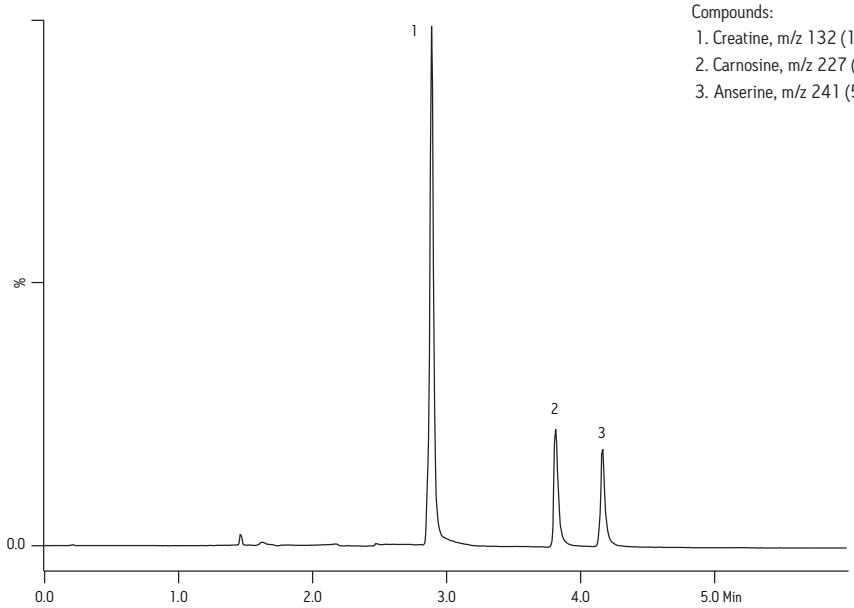
Carnosine



Anserine

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.5	0.1	99.9
5	0.5	99.9	0.1
5.01	0.5	0.1	99.9
6	0.5	0.1	99.9

Histidine Dipeptides



Compounds:
1. Creatine, m/z 132 (1 µg/mL)
2. Carnosine, m/z 227 (1 µg/mL)
3. Anserine, m/z 241 (5 µg/mL)

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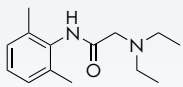
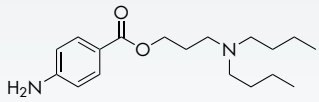
Analysis of Local Anesthetics by HILIC using CORTECS UPLC 1.6 µm Columns

CONDITIONS

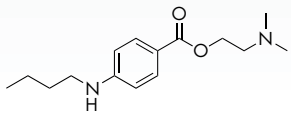
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 50 mm (p/n 186007104)
Mobile phase A:	50:50 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Mobile phase B:	90:10 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Detection:	UV at 245 nm
Gradient:	See table
Flow rate:	0.8 mL/min
Injection volume:	5.0 µL
Column temp.:	30 °C
Sample diluent:	75:25 acetonitrile/methanol with 0.2% formic acid



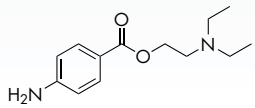
Lidocaine



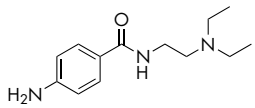
Butacaine



Tetracaine



Procaine

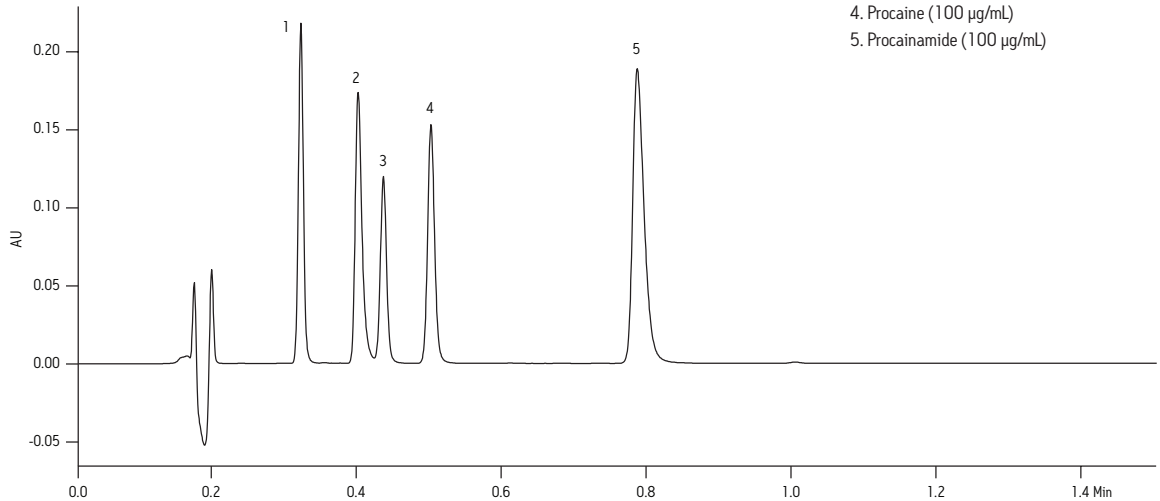


Procainamide

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.8	0.1	99.9
1.0	0.8	0.1	99.9
2.6	0.8	99.9	0.1
2.7	0.8	0.1	99.9
3.5	0.8	0.1	99.9

Local Anesthetics

Compounds:
1. Lidocaine (100 µg/mL)
2. Butacaine (100 µg/mL)
3. Tetracaine (100 µg/mL)
4. Procaine (100 µg/mL)
5. Procainamide (100 µg/mL)



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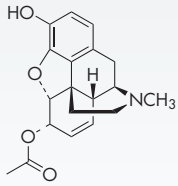
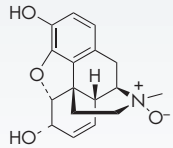
Analysis of Morphine Metabolites using CORTECS UPLC 1.6 µm Columns

CONDITIONS

System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 50 mm (p/n 186007104)
Mobile phase A:	50:50 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Mobile phase B:	90:10 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Detection:	UV at 280 nm
Flow rate:	1.235 mL/min
Gradient:	See table
Injection volume:	5 µL
Column temp.:	30 °C
Sample diluent:	Mobile phase B

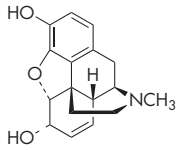


6-Acetylmorphine

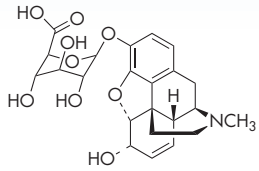


Morphine-N-oxide

Time (min)	Flow Rate (mL/min)	%A	%B
0.00	1.235	0.1	99.9
0.51	1.235	0.1	99.9
2.11	1.235	99.9	0.1
2.19	1.235	0.1	99.9
3.00	1.235	0.1	99.9



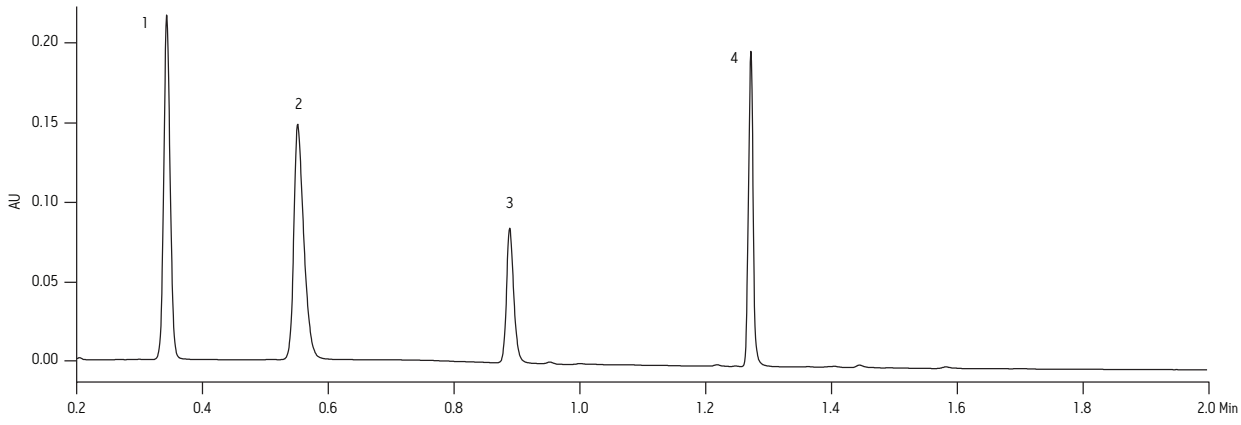
Morphine



Morphine-3β-glucuronide

Morphine Metabolites

Compounds:
1. 6-Acetylmorphine (0.2 mg/mL)
2. Morphine (0.2 mg/mL)
3. Morphine-N-oxide (0.1 mg/mL)
4. Morphine-3β-glucuronide (0.2 mg/mL)



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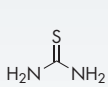
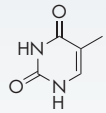
Analysis of Nucleic Acid Bases using CORTECS UPLC 1.6 µm Columns

CONDITIONS

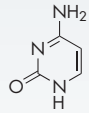
System:	ACQUITY UPLC® I-Class with ACQUITY® PDA
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 50 mm (p/n 186007104)
Mobile phase A:	50:40:10 acetonitrile/methanol/20 mM ammonium acetate with 0.05% acetic acid
Mobile phase B:	90:5:5 acetonitrile/methanol/4 mM ammonium acetate with 0.01% acetic acid
Detection:	UV at 254 nm
Flow rate:	0.45 mL/min
Gradient:	See table
Injection volume:	0.4 µL
Column temp.:	30 °C
Sample diluent:	75:25 acetonitrile/methanol with 0.2% formic acid



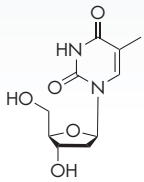
Thiourea



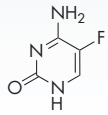
Thymine



Cytosine



Thymidine

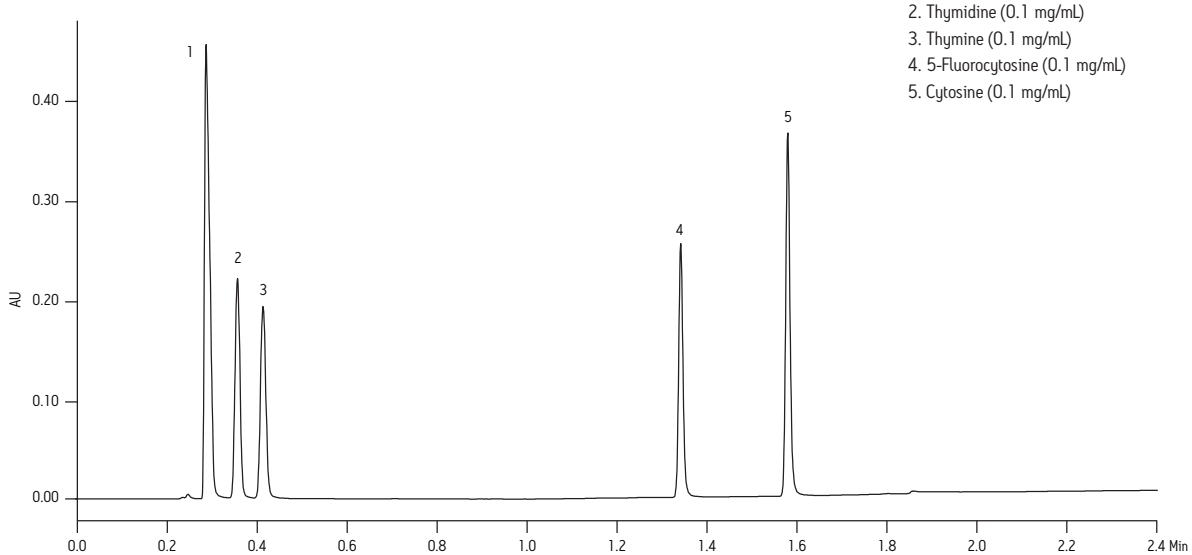


5-Fluorocytosine

Time (min)	Flow Rate (mL/min)	%A	%B
0.00	0.45	0.1	99.9
0.51	0.45	0.1	99.9
2.11	0.45	99.9	0.1
2.19	0.45	0.1	99.9
3.00	0.45	0.1	99.9

Nucleic Acid Bases

Compounds:
1. Thiourea (0.05 mg/mL)
2. Thymidine (0.1 mg/mL)
3. Thymine (0.1 mg/mL)
4. 5-Fluorocytosine (0.1 mg/mL)
5. Cytosine (0.1 mg/mL)



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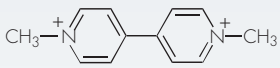
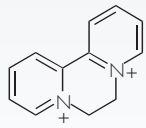
Analysis of Paraquat and Diquat in Drinking Water using CORTECS UPLC 1.6 µm Columns

CONDITIONS

System:	ACQUITY UPLC® H-Class with photodiode array (PDA) detection with ACQUITY® TQD Mass Spectrometer
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 100 mm (p/n 186007106)
Separation mode:	Isocratic (50:50 mobile phase A:B)
Mobile phase A:	200 mM ammonium formate buffer at pH 3.7
Mobile phase B:	Acetonitrile
Injection volume:	20 µL
Column temp.:	30 °C
Flow rate:	0.5 mL/min
PDA detection:	Diquat UV at 308 nm, paraquat UV at 257 nm
Sample vials:	Polypropylene autosampler vials (p/n 186002642)



Paraquat



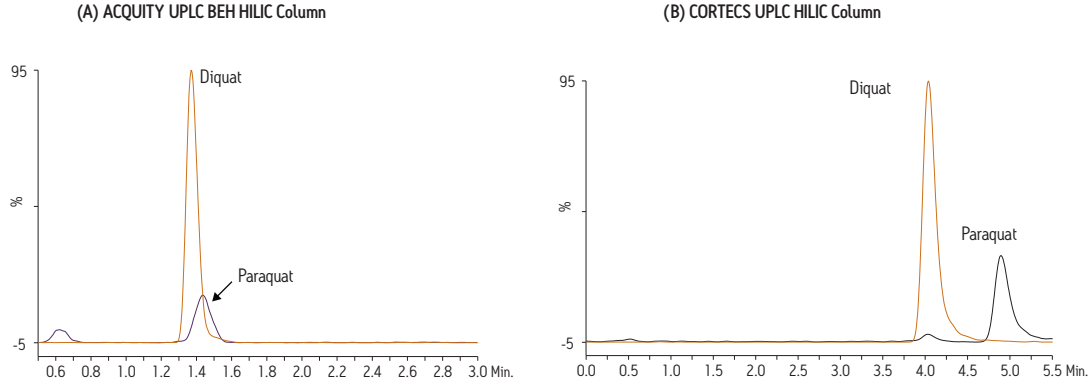
Diquat

MRM Transitions

Compound	MRM	Cone (V)	CID (eV)
Diquat	183.1 > 157.1	50	25
	183.1 > 130.1	50	30
Paraquat	185.1 > 170.1	38	22
	171.1 > 77.0	45	40

To see the full application note, visit www.waters.com and search for literature code: 720004732EN

Paraquat and Diquat in Drinking Water



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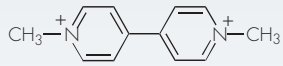
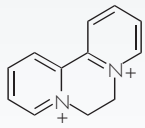
Determination of Paraquat and Diquat in Potato and Wheat Using the CORTECS UPLC 1.6 µm Column

CONDITIONS

System:	ACQUITY UPLC® H-Class with ACQUITY® TQD Mass Spectrometer
Column:	CORTECS® HILIC, 1.6 µm, 2.1 x 100 mm (p/n 186007106)
Isocratic:	50:50 A/B
Mobile phase A:	200 mM ammonium formate buffer at pH 3.7
Mobile phase B:	Acetonitrile
Injection volume:	20 µL
Column temp.:	30 °C
Wash solvent:	50:50 acetonitrile/water
Purge solvent:	50:50 acetonitrile/water
Flow rate:	0.5 mL/min
Sample vials:	Polypropylene autosampler vials (p/n 186002642)
Ionization mode:	Positive Electrospray
Source temp.:	150 °C
Desolvation temp.:	350 °C
Desolvation gas flow:	800 L/hr
Cone gas flow:	30 L/hr
Collision gas flow:	0.20 mL/min



Paraquat

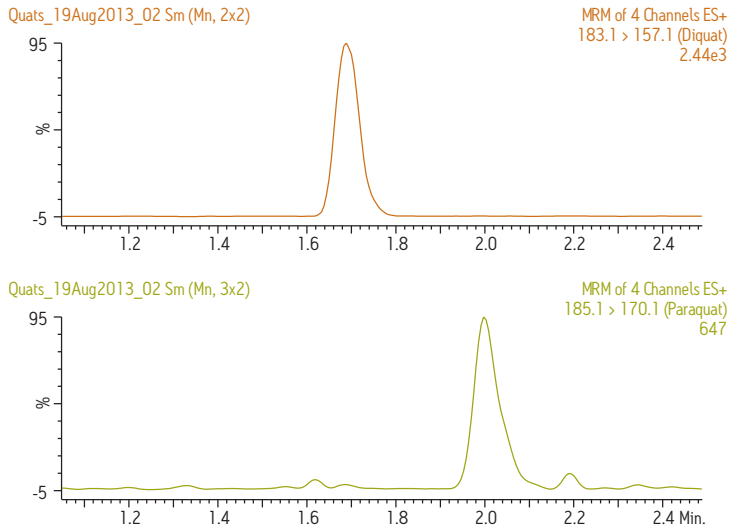


Diquat

MRM Transitions

Compound	MRM	Cone (V)	CID (eV)
Diquat	183.1 > 157.1	50	25
	183.1 > 130.1	50	30
Paraquat	185.1 > 170.1	38	22
	171.1 > 77.0	45	40

Paraquat and diquat in potato



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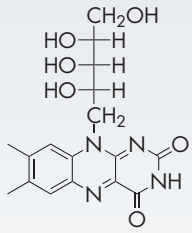
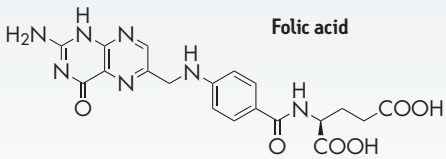
Analysis of Water Soluble Vitamins using CORTECS UPLC 1.6 µm Columns

CONDITIONS

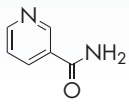
System:	ACQUITY UPLC® with ACQUITY® PDA
Column:	CORTECS® UPLC® HILIC, 1.6 µm, 2.1 x 50 mm (p/n 186007104)
Mobile phase A:	50:50 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Mobile phase B:	90:10 acetonitrile/10 mM ammonium formate with 0.125% formic acid
Detection:	UV at 265 nm
Flow rate:	0.5 mL/min
Gradient:	See table
Injection volume:	5.0 µL
Column temp.:	30 °C
Sample diluent:	75:25 acetonitrile/methanol with 0.2% formic acid



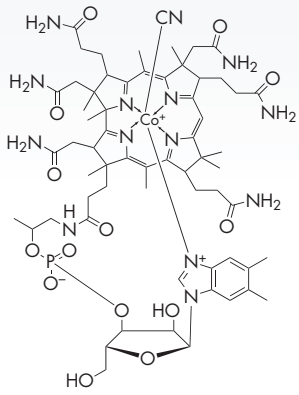
Riboflavin



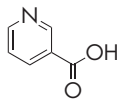
Folic acid



Nicotinamide



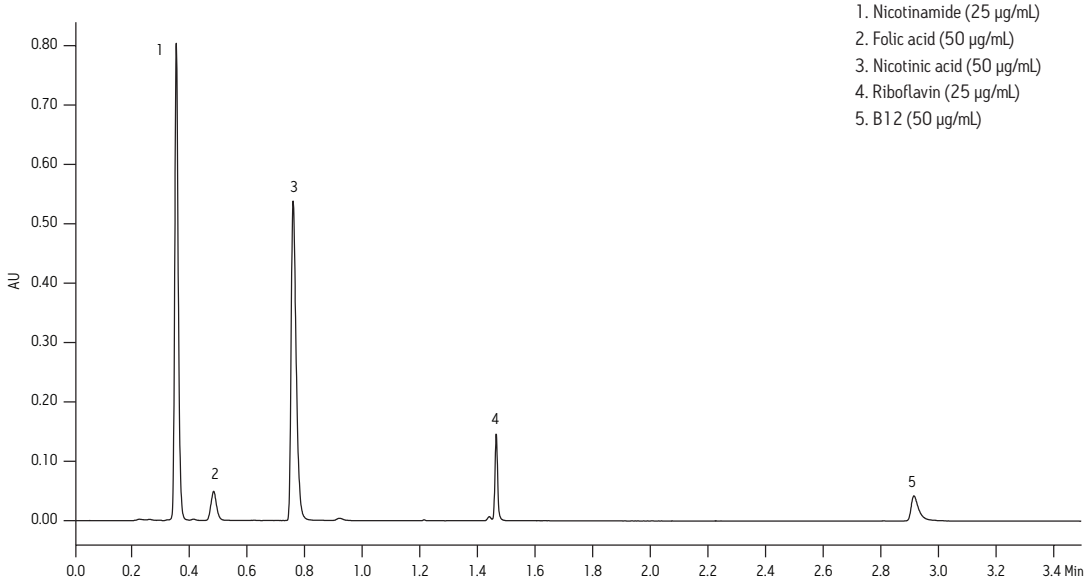
Vitamin B12



Nicotinic acid

Time (min)	Flow Rate (mL/min)	%A	%B
Initial	0.5	0.1	99.9
5.0	0.5	99.9	0.1
5.1	0.5	0.1	99.9
6.0	0.5	0.1	99.9

Water Soluble Vitamins



Compounds:
1. Nicotinamide (25 µg/mL)
2. Folic acid (50 µg/mL)
3. Nicotinic acid (50 µg/mL)
4. Riboflavin (25 µg/mL)
5. B12 (50 µg/mL)

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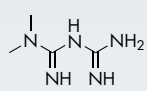
Analysis of Basic Drugs in River Water using CORTECS 2.7 µm Columns

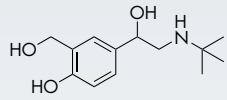
CONDITIONS

System:	ACQUITY UPLC® H-Class with Xevo® TQD Mass Spectrometer
Column:	CORTECS® HILIC, 2.7 µm, 2.1 x 100 mm (p/n 186007382)
Flow rate:	0.28 mL/min
Mobile phase A:	Water + 0.1% acetic acid/ammonium acetate buffer (1 g/L water)
Mobile phase B:	Acetonitrile
Gradient:	See table
Column temp.:	45 °C
Sample:	Basic drugs from river water
Sample preparation	200 mL river water (pH 5.0 with acetic acid) prepared using Oasis® MCX 6 cc Vac Cartridge, 150 mg sorbent per cartridge, 30 µm particle size) (p/n 186000256)
Ionization mode:	ESI+
Capillary voltage:	1.5 kV
Desolvation temp.:	500 °C
Desolvation gas flow:	1000 L/Hr
Source temp.:	150 °C

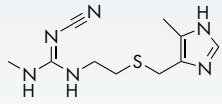
Time (min)	Flow Rate (mL/min)	%A	%B	Curve
Initial	0.280	2	98	–
4.50	0.280	30	70	6
10.80	0.280	30	70	6
11.25	0.280	2	98	6
14.40	0.280	2	98	6
4.50	0.280	2	98	6



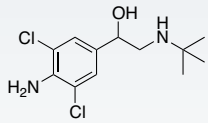
Metformin



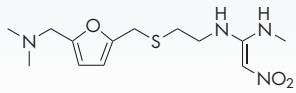
Salbutamol



Cimetidine

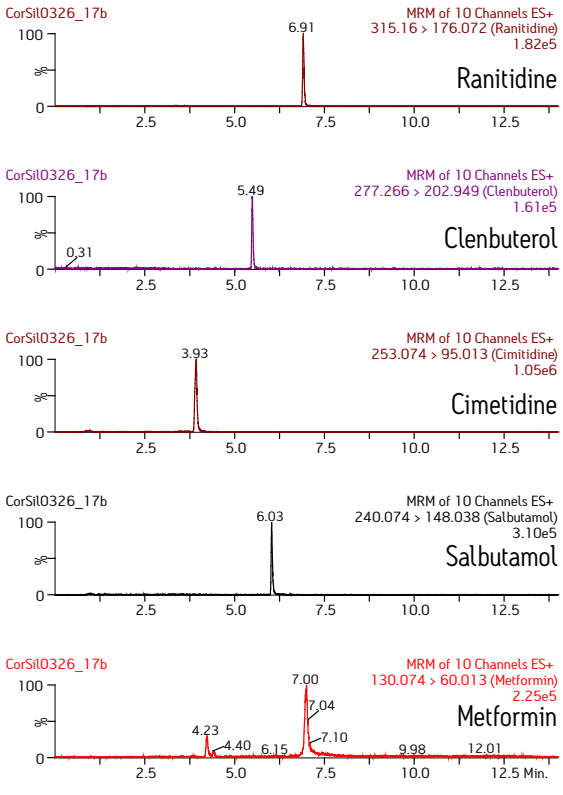


Clenbuterol



Ranitidine

25 ppt Spiked River Water



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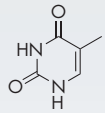
Analysis of HILIC Quality Control Reference Material (QCRM) using CORTECS 2.7 µm Columns

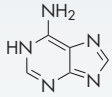
CONDITIONS

System:	ACQUITY UPLC® with PDA Detector
Column:	CORTECS® HILIC, 2.7 µm, 4.6 x 100 mm (p/n 186007392)
Mobile phase:	90:10 acetonitrile/100 mM ammonium formate (pH 3.0) (v/v)
Flow rate:	2.0 mL/min
Separation:	Isocratic
Injection volume:	9.6 µL
Column temp.:	30 °C
Sample:	HILIC QCRM (p/n 186007226)

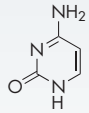
Acenaphthene



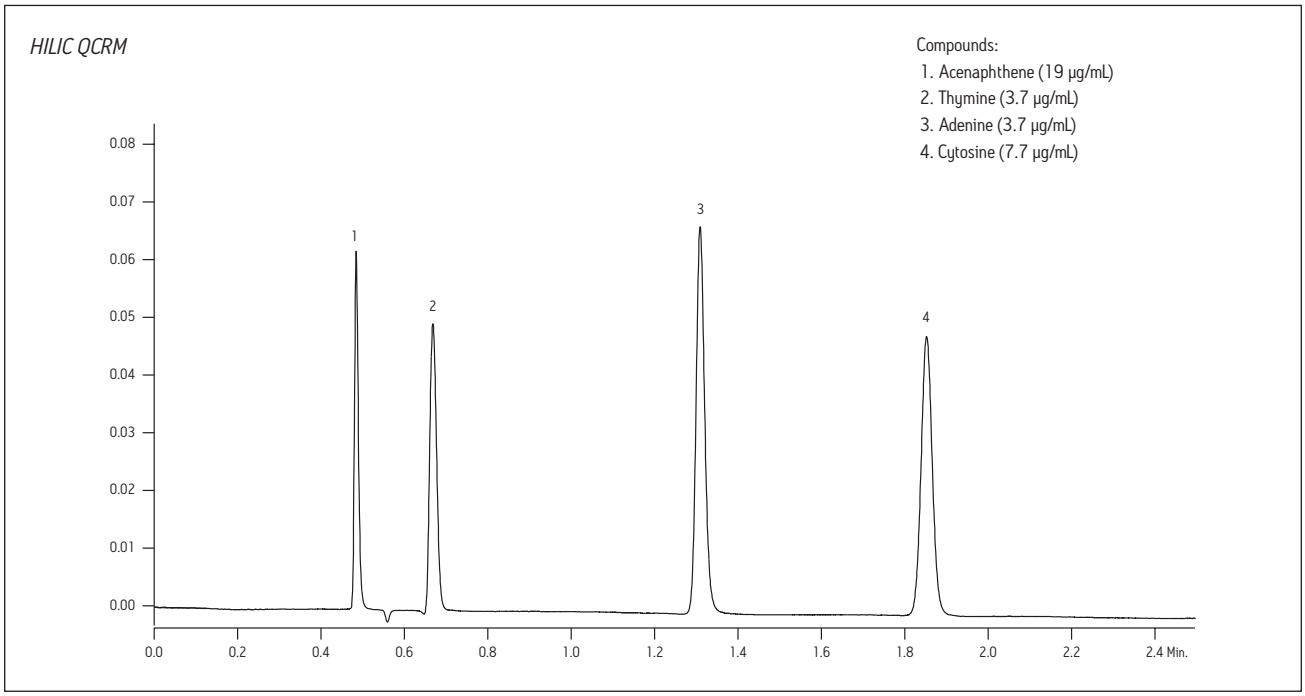
Thymine



Adenine



Cytosine



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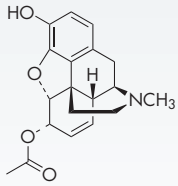
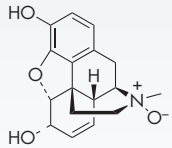
Analysis of Morphine Metabolites using CORTECS 2.7 µm Columns

CONDITIONS

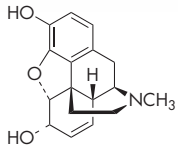
System:	Alliance® HPLC with 2998 Photodiode Array Detector
Column:	CORTECS® HILIC, 2.7 µm, 4.6 x 150 mm (p/n 186007393)
Mobile phase A:	10 mM ammonium formate in 50% acetonitrile/49.875% water/0.125% formic acid
Mobile Phase B:	10 mM ammonium formate in 90% acetonitrile/9.875% water/0.125% formic acid
Detection:	UV at 280 nm
Flow rate:	1.99 mL/min
Gradient:	See table
Injection volume:	14.4 µL
Column temp.:	30 °C
Sample:	Morphine Metabolites
Sample diluent:	Mobile phase B



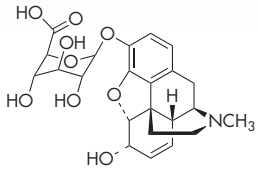
6-Acetylmorphine



Morphine-N-oxide



Morphine

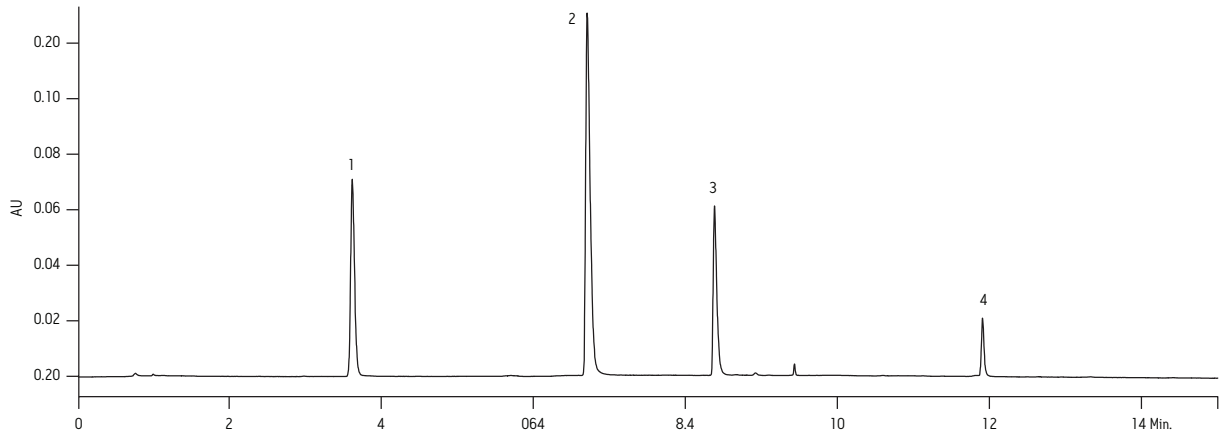


Morphine-3β-glucuronide

Time (min)	%A	%B	Curve
Initial	0.1	99.9	–
4.42	0.1	99.9	6
18.29	99.9	0.1	6
18.99	0.1	99.9	11
26.01	0.1	99.9	11

Morphine Metabolites

Compounds:
1. 6-Acetylmorphine (0.2 mg/mL)
2. Morphine (0.2 mg/mL)
3. Morphine-N-oxide (0.1 mg/mL)
4. Morphine-3β-glucuronide (0.2 mg/mL)



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Germany 49 6196 400 600

Hong Kong 852 2964 1800

Hungary 36 1 350 5086

India 91 080 49292200 03

Ireland 353 1 448 1500

Israel 9723 3731391

Italy 39 02 265 0983

Japan 81 3 3471 7191

Korea 82 2 6300 9200

Mexico 52 55 52 00 1860

The Netherlands 31 76 508 7200

Norway 47 6 384 6050

Poland 48 22 101 5900

Portugal 351 21 893 61 77

Puerto Rico 1 787 747 8445

Russia/CIS 7 495 727 4490 / 290 9737

Singapore 65 6593 7100

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