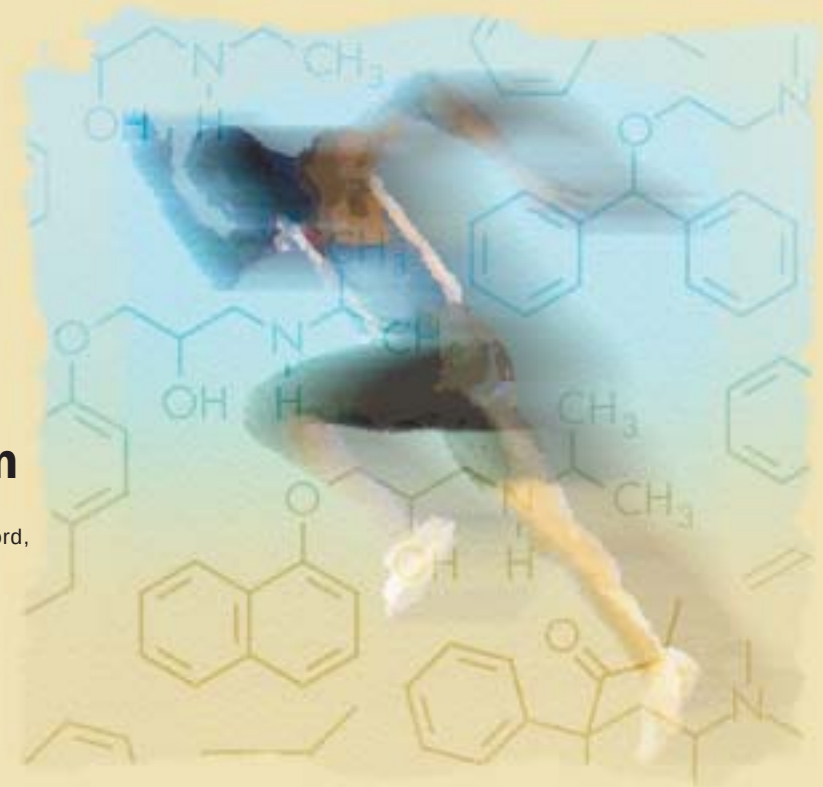
Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Forensic Applications Notebook



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Waters OASIS®
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Waters Oasis® Mixed-Mode Sample Extraction Products

Since 1996 Oasis® sample extraction products have been setting new standards for solid-phase extraction. Oasis® HLB products freed you from stopcock usage and pH constraints. Life in the bioanalysis lab has become simpler and more efficient.

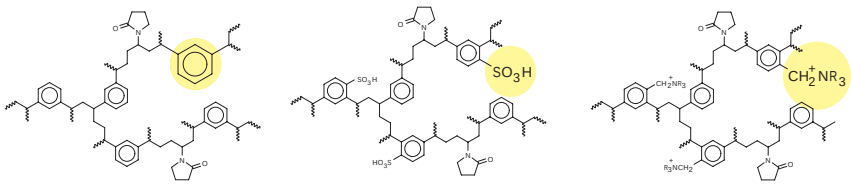
Now you can achieve even higher selectivity and sensitivity for extracting basic, acidic, and neutral compounds with the newest members of the Oasis® family.

Oasis® MCX **M**ixed-mode **C**ation-e**X**change reversed-phase and Oasis® MAX **M**ixed-mode **A**nion-e**X**change reversed-phase sorbents. They are designed to meet the stringent criteria for modern solid-phase extraction allowing for high selectivity and sensitivity, when extracting basic, acidic, and neutral molecules from biological matrices. Oasis® MCX and MAX exchangers are based on the novel, water-wettable Oasis® HLB Chemistry [Poly (divinyl-benzene-co-N-vinylpyrrolidone (DVB/NVP)], and are among the most recognized and extensively used SPE polymers in the world today.

SPE achieved with the highest selectivity, sensitivity, and speed

Better – Faster – Cleaner

Extract basic, acidic, and neutral compounds from urine, plasma, and serum with <u>NO CONDITIONING</u>



Oasis® HLB **Oasis® MCX** **Oasis® MAX**

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Introduction

The Waters Oasis® MCX solid-phase extraction cartridges contain a patented polymeric, water-wettable, sorbent, stable from pH 0 to 14. Since the polymeric sorbent is free of silanol groups, extraction with Oasis® MCX is not complicated by sample-silanol interactions. As a mixed-mode, cation-exchange sorbent, Oasis® MCX maintains efficient retention of acidic, neutral, and basic drugs. With a higher binding capacity, less variability, and pH stability, the Oasis® MCX cartridges provide an ideal means for routine solid phase extraction of drugs and chemicals from biological matrices. The Zymark Rapid Trace™ SPE Workstation is being used extensively in Forensic Urine Drug Testing Laboratories for the routine extraction of Drugs of Abuse from urine. Our objective is to combine Oasis® MCX cartridges with the Zymark Rapid Trace™ workstation to develop a simple and universal procedure for the extraction of the SAMHSA* 5 Drugs of Abuse.

These Drugs of Abuse include:

- Amphetamines: Amphetamine & Methamphetamine
- Cannabinoids: Carboxy-THC (11-Nor-9-carboxy-delta-9-THC)
- Cocaine: Benzoylecgonine
- Opiates: Codeine, Morphine, 6-Monoacetyl Morphine
- Phencyclidine

The following objectives guided the development of these procedures:

1. The extraction procedures met the analytical criteria established within the Guidelines of the National Laboratory Certification Program. These analytical criteria included:
   - Accuracy at a concentration of 40% of the SAMHSA Cutoff
   - Reproducibility at 40% of the SAMHSA Cutoff
   - A signal to noise ratio > 20/1 at 40% of the SAMHSA Cutoff
   - Documented linearity at and around the SAMHSA Cutoff
   - Documented extraction efficiency that was reproducible
2. The extraction procedures required minimal steps in the preparation of the SPE cartridge and in the SPE extraction of the drugs from urine.
3. The extraction procedures were, to the extent possible, be universal across all 5 SAMHSA drug classes.
4. The extraction procedures minimized the use of special buffers, multiple solvent mixtures and expensive reagents.

* SAMHSA = Substance Abuse & Mental Health Services Administration

These procedures include extraction of the SAMHSA drugs of abuse from urine and analysis by Gas Chromatography/Mass Spectrometry. Deuterated Internal Standards enabled quantitation, and the mass spectrometric mode was Ion Monitoring (SIM) in accordance to the Guidelines of the National Laboratory Certification Program (NLCP). Following development, the procedures were validated for accuracy, reproducibility and extraction efficiency by Gas Chromatography/Mass Spectrometry. A minimum of three concentrations of each drug and three replicates, with 3 to 5 samples per replicate for each drug concentration, were used in the validation. Extraction efficiency was measured in a separate study using 4 to 5 samples for each drug, at the SAMHSA Cutoff, with comparison to unextracted samples. Urine controls were purchased from El Sohly Laboratories. Instrumental analysis was performed on either a Hewlett Packard 5890/5971 GC/MS or a Shimadzu QP 5000 with a 15-m DB-1 capillary column.

Standard curves, ranging from LOQ to above the SAMHSA Cutoff, were conducted for both Carboxy-THC and Phencyclidine to demonstrate assay linearity. In accordance with general and accepted practices, measurement of each drug was performed using a One Point Calibration, at or near the SAMHSA Cutoff, with Deuterated Internal Standard. The results obtained from these studies demonstrated an efficient and highly reproducible universal extraction procedure for the SAMHSA 5 Drugs of Abuse.

Advantages of the Waters Oasis® MCX cartridges demonstrated are:

- **No requirement for pretreatment of cartridges**
- **Minimal use of organic solvents and buffers**
- **A universal extraction procedure for basic, neutral and acidic drugs**
- **An extraction procedure consisting of only 4 separate steps (Without lengthy air drying step before elution):**

  1. Wash with NaOH or Alkaline Buffer (Opiates)

  2. Wash with water

  3. Wash with hexane

  4. Elute with 2-propanol/methylene chloride (75/25)

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Waters Corporation: Pamela Iraneta, Michael Early, Roula Veligratli, Stephane Manoury, Richard Niemi, Ian hanslope

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Oasis® Forensic Applications for GC/MS

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Validation Data for SAMHSA-5 Drugs of Abuse on Oasis® MCX Single Method

Summary of Analytical Results

	Target Value	Mean	% Rel. Recovery	SD	CV	N
Amphetamine						
Low	130 ng/ml	128.2	93.6%	5.1	4.00%	12
Medium	300 ng/ml	301.9	100.6%	11.6	3.84%	12
High	550 ng/ml	562.7	102.3%	23.2	4.12%	11
Methamphetamine						
Low	250 ng/ml	233.5	93.4%	19.8	8.48%	10
Medium	500 ng/ml	535.3	107.1%	47.4	8.85%	12
High	1000 ng/ml	1051.0	105.1%	93.7	8.92%	9
Benzoylecgonine						
Low	60 ng/ml	59.6	99.3%	2.6	4.36%	13
Medium	150 ng/ml	145.1	96.7%	7.6	5.24%	13
High	300 ng/ml	290.4	96.8%	17.1	5.89%	13
Carboxy-THC						
Low	6 ng/ml	7.4	123.3%	0.3	4.05%	15
Medium	15 ng/ml	15.9	106.0%	0.5	3.14%	14
High	60 ng/ml	68.0	113.3%	3.3	4.85%	15
Extended High		109.2	109.2%	3.5	3.21%	15
Morphine						
Low	60 ng/ml	61.3	102.2%	4.3	7.01%	12
Medium	150 ng/ml	147.4	98.3%	8.3	5.63%	14
High	300 ng/ml	291.4	97.1%	16.4	5.63%	13
Codeine						
Low	60 ng/ml	62.1	103.5%	2.4	3.86%	12
Medium	150 ng/ml	150.5	100.3%	6.0	3.99%	14
High	300 ng/ml	298.2	99.4%	16.0	5.37%	13
6-Monoacetyl-morphine						
Low	4.0 ng/ml	4.3	107.5%	0.4	9.00%	9
Medium	10 ng/ml	9.4	94.0%	0.7	7.60%	10
High	20 ng/ml	20.6	103.0%	1.4	7.00%	13
Phencyclidine						
Extended Low	3.125 ng/ml	3.05	97.6%	0.2	7.38%	8
Low	6.25 ng/ml	6.3	100.0%	0.4	6.53%	8
Medium	12.5 ng/ml	13.2	105.6%	1.0	7.88%	7
High	25.0 ng/ml	26.2	104.8%	1.2	4.51%	8
Extended High	50.0 ng/ml	48.7	97.4%	3.1	6.46%	8

Oasis® MCX Extraction Efficiency

	Mean Recovery	CV
Amphetamine	59.40%	1.64%
Methamphetamine	57.30%	10.63%
Benzoylecgonine	78.72%	5.36%
Carboxy-THC	77.08%	6.28%
Codeine	82.69%	5.58%
Morphine	67.94%	7.68%
6-Monoacetyl-morphine	92.64%	8.00%
Phencyclidine	67.61%	3.49%

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Preparation of Solutions

1.5 M Carbonate Buffer pH 9.3
Dissolve 79.5 g sodium carbonate and 63.0 g sodium bicarbonate in 800 ml of de-ionized water. Heat to dissolve. Cool. Adjust the pH to 9.3 with 5 N HCl or 12 N NaOH. Q.S. to 1 liter with de-ionized water.

0.15 M Carbonate Buffer pH 9.5
Dissolve 7.95 g sodium carbonate and 6.3 g sodium bicarbonate in 800 ml of de-ionized water. Adjust the pH to 9.5 with 5 N HCl or 12 N NaOH. Q.S. to 1 liter with de-ionized water.

2.0 M Sodium Acetate Buffer pH 4.8
Dissolve16.4 g sodium acetate, anhydrous, in 80 ml of de-ionized water. Adjust the pH to 4.8 with acetic acid. Q.S. to 100 ml with de-ionized water.

12.0 M NaOH
Dissolve 48.0 g of NaOH in 80 ml of de-ionized water. Cool. Q.S. to 100 ml with de-ionized water.

5.0 N HCL
Add 206.0 ml of concentrated HCl to 200 ml of de-ionized water. Q.S. to 500 ml with de-ionized water.

1% HCL in methanol
Add 1.0 ml of concentrated HCl to 80 ml of methanol. Q.S. to 100 ml with methanol.

11.8 M KOH
Add 331.0 g KOH to 200 ml of de-ionized water. Cool. Q.S. slowly to 500 ml.

0.1 M NaOH
Add 4.0 g NaOH to 500 ml of de-ionized water. Q.S. to 1000 ml.

For best possible results prepare fresh solutions daily

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Methods & Materials

Reagents

B-Glucuronidase: Sigma Type Hp-2 from Helix Pomatia

Hydrochloric Acid : Concentrated

Iodomethane: Sigma

N-methyl-N-(trimethylsilyl)trifluoroacetamide (MSTFA)

Pentafluoropropanol (PFP)

Pentafluoropropionic Anhydride (PFPA)

Potassium Hydroxide Pellets

Propionic Anhydride

Pyridine: ACS reagent

Sodium Acetate Anhydrous

Sodium Bicarbonate Powder

Sodium Carbonate Anhydrous Powder

Sodium Hydroxide Pellets

Tetrabutylammonium Hydroxide: 40% solution Sigma

Solvents & Solvent Mixtures:

Ethyl Acetate: HPLC Grade

Methanol: HPLC Grade

Dimethyl Sulfoxide 99.5%

Methylene Chloride: Nanograde

Isooctane: HPLC Grade

Hexane: HPLC Grade

2-Propanol: HPLC Grade

2-Propanol/Methylene Chloride (75/25)

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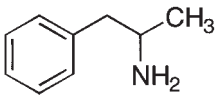
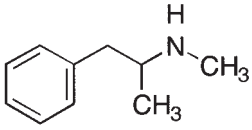
Amphetamines in Urine by GC/MS using Waters Oasis® MCX 3 cc (60 mg) Sample Extraction Column and Zymark Rapid Trace™



Amphetamine



Methamphetamine

1. Sample preparation

- Place 3.2 ml of urine in an appropriate tube.
- Add 32 µl of 5N HCl and internal standard (suggested IS: D-6 Amphetamines and D-9 Methamphetamine).

2. Load

Load 3.0 ml of sample onto the column at a rate of 2 ml/min.

3. Rinse column

- 2.0 ml of 0.1 N NaOH at a rate of 2 ml/min.
- 2.0 ml of de-ionized water at a rate of 8 ml/min.
- Purge cannula with 6 ml of water at a rate of 30 ml/min. Rapid Trace™ only
- 4.0 ml of hexane at a rate of 8 ml/min.

4. Elute

Elute with 3 ml of 2-propanol/methylene chloride (75/25), at a rate of 2 ml/min.

5. Acidify

Add 100 µl of 1% HCl in methanol to each tube before evaporating.

6. Evaporate

Evaporate eluant under nitrogen at 50˚ C.

7. Derivatize

- Add 50 µl of ethyl acetate & 40 µl of PFPA. Cap and mix. React at 75 °C for 15 minutes.
- Evaporate to dryness at 50˚ C.
- Reconstitute in 50 µl of ethyl acetate.

8. Quantitation: Monitor ions

- Amphetamine, 190 (Quant. ion), 118, 92
- D-6 Amphetamine, 194 (Quant. ion), 123, 93
- Methamphetamine, 204 (Quant. ion), 160, 118
- D-9 Methamphetamine, 211 (Quant. ion), 163, 123

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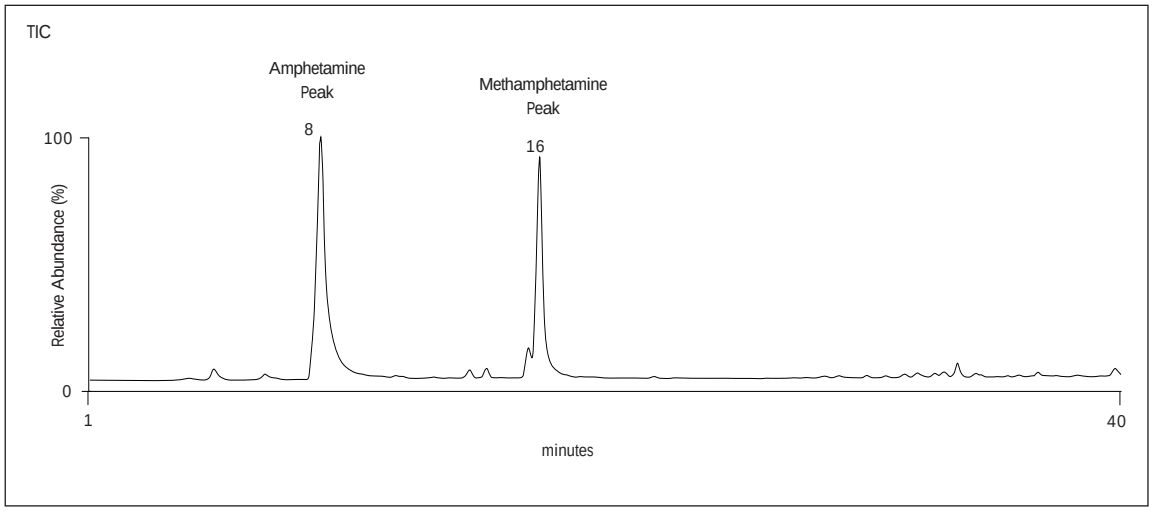
Drugs	Amphetamine / Methamphetamine
Classification:	Stimulant
CSA Schedule:	Schedule II
Trade or Other Names:	Biphetamine; Desoxyn; Dexedrine; Obetrol; Ice
Medical Uses:	Attention Deficit Disorder; Narcolepsy; Weight control
Physical Dependence:	Possible
Psychological Dependence:	High
Tolerance:	Yes
Duration (hours):	2-4
Usual Method:	Oral; Injected; Smoked
Possible Effects:	Increased alertness; Excitation; Euphoria; Increased pulse rate and blood pressure; Insomnia; Loss of appetite
Effects of Overdose:	Agitation; Increased body temperature; Hallucinations; Convulsions; Possible death
Withdrawal Syndrome:	Apathy; Long periods of sleep; Irritability; Depression; Disorientation



Instrument: Shimadzu 17A Gas Chromatograph / QP5000 Mass Spectrometer
Column: DB-1 (J&W Scientific), 15 m x 0.25 mm x 0.25 µm
Injection Port Temperature: 220 ˚C
Transfer Line Temperature: 300 ˚C
Oven Temperatures:
Initial: 60˚ C for 1 min.
Ramp 1: 25˚ C / min to 160˚ C
Ramp 2: 40˚ C / min to 300˚ C
Final: 300˚ C

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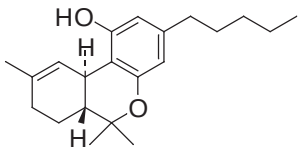
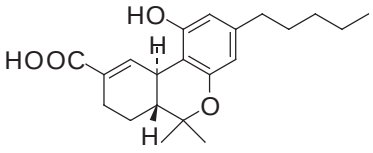
Carboxy THC in Urine by GC/MS using Waters Oasis® MCX 3 cc (60 mg) Sample Extraction Column and Zymark Rapid Trace™



Δ9-Tetrahydrocannabinol



Carboxy-Δ9-tetrahydrocannabinol

1. Base hydrolysis

- Place 3.0 ml of urine in an appropriate tube.
- Add internal standard (suggested IS: D-6 Carboxy THC).
- Add 200 µl of 11.8 M KOH. Cap and vortex.
- Heat at 60 ˚C for 15 minutes. Allow sample to cool.

2. Load

Load 3.0 ml of sample onto the column at a rate of 2 ml/min.

3. Rinse column

- 2.0 ml of 0.1 N NaOH at a rate of 2 ml/min.
- 2.0 ml of de-ionized water at a rate of 8 ml/min.
- Purge cannula with 6 ml of water at a rate of 30 ml/min. Rapid Trace™ only
- 4.0 ml of hexane at a rate of 8 ml/min.

4. Elute

Elute with 3 ml of 2-propanol/methylene chloride (75/25), at a rate of 2 ml/min.

5. Evaporate

Evaporate eluant under nitrogen at 50 ˚C.

6. Derivatize

- Add 150 µl of TBAH/DMSO (2/98). Vortex and let stand for 2 min.
- Add 50 µl of iodomethane. Vortex and let stand for 5 min.
- Add 350 µl of 0.1 N HC1. Vortex
- Add 2 ml of isooctane. Vortex
- Centrifuge. Transfer solvent layer to a clean tube.
- Repeat and combine extracts
- Evaporate under nitrogen at 50 ˚C.
- Reconstitute with 30 µl of isooctane.

7. Quantitation: Monitor ions

- Carboxy THC: 313 (Quant ion), 357, 372
- D-6 Carboxy THC: 319 (Quant. ion), 363, 378

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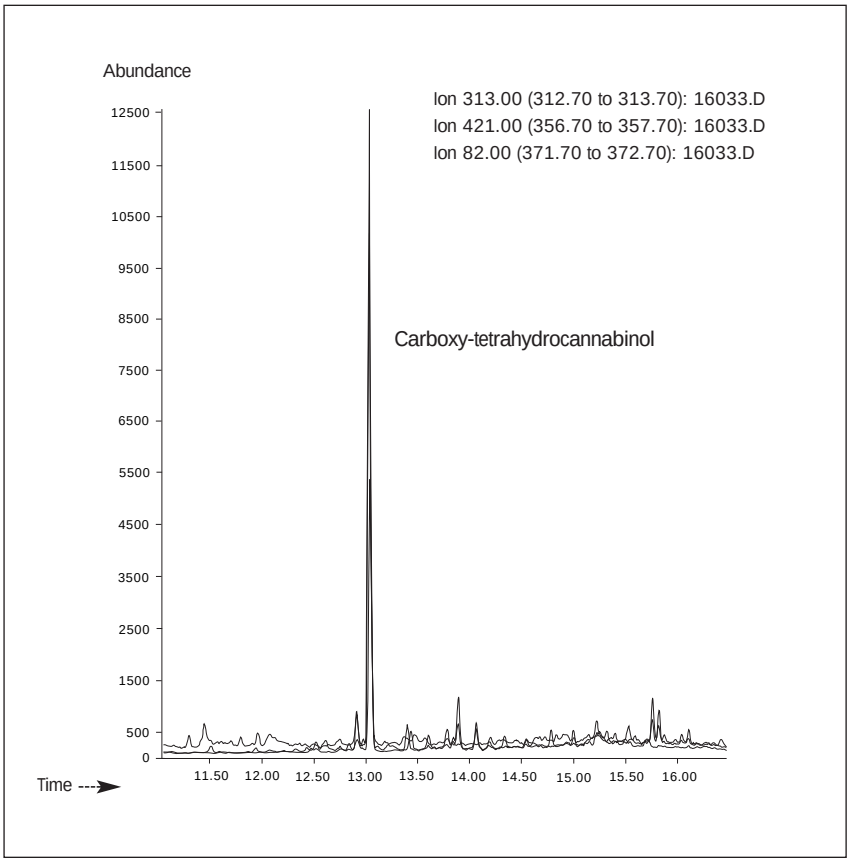
Drug	Tetrahydrocannabinol
Classification:	Cannabis
CSA Schedule:	Schedule I, II
Trade or Other Names:	THC; Marinol
Medical Uses:	Anti-nauseant
Physical Dependence:	Unknown
Psychological Dependence:	Moderate
Tolerance:	Yes
Duration (hours):	2-4
Usual Method:	Smoked; Oral
Possible Effects:	Euphoria; Relaxed inhibitions; Increased appetite; Disorientation
Effects of Overdose:	Fatigue; Paranoia; Possible psychosis
Withdrawal Syndrome:	Occasional reports of insomnia; Hyperactivity; Decreased appetite



Instrument: HP 5890 Series II Gas Chromatograph / 5971 Mass Spectrometer
Column: DB-1 (J&W Scientific), 15 m x 0.25 mm x 0.25 µm
Injection Port Temperature: 260˚ C
Transfer Line Temperature: 310˚ C
Oven Temperatures:
Initial: 100˚ C for 3 min.
Ramp 1: 30˚ C/min to 180˚ C
Ramp 2: 10˚ C/min to 265˚ C
Ramp 3: 30˚ C/min to 300˚ C
Final: 300˚ C for 1 min hold

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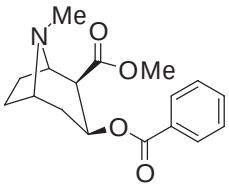
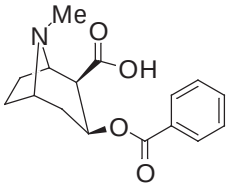
Benzoylecgonine in Urine by GC/MS using Waters Oasis® MCX 3 cc (60 mg) Sample Extraction Column and Zymark Rapid Trace™



Cocaine



Benzoylecgonine

1. Sample preparation

- Place 3.2 ml of urine in an appropriate tube.
- Add 32 µl of 5N HCl and internal standard (suggested IS: D-3 Benzoylecgonine).

2. Load

Load 3.0 ml of sample onto the column at a rate of 2 ml/min

3. Rinse column

- 2.0 ml of 0.1 N NaOH at a rate of 2 ml/min.
- 2.0 ml of de-ionized water at a rate of 8 ml/min.
- Purge cannula with 6 ml of water at a rate of 30 ml/min. Rapid Trace™ only
- 4.0 ml of hexane at a rate of 8 ml/min.

4. Elute

Elute with 3 ml of 2-propanol/methylene chloride (75/25), at a rate of 2 ml/min.

5. Evaporate

Evaporate eluant under nitrogen at 50˚ C.

6. Derivatize

- Add 50 µl of ethyl acetate & 40 µl of PFPA (pentafluoropropionic anhydride) Cap and mix.
- Add 20 µl of PFP (pentafluoropropanol). Cap and mix.
- React at 75 ˚C for 15 minutes. Evaporate to dryness at 50 ˚C.
- Reconstitute in 50 µl of ethyl acetate.

7. Quantitation: Monitor ions

- Benzoylecgonine: 300 (Quant ion), 421, 82
- D-3 Benzoylecgonine: 303 (Quant. ion), 424, 85

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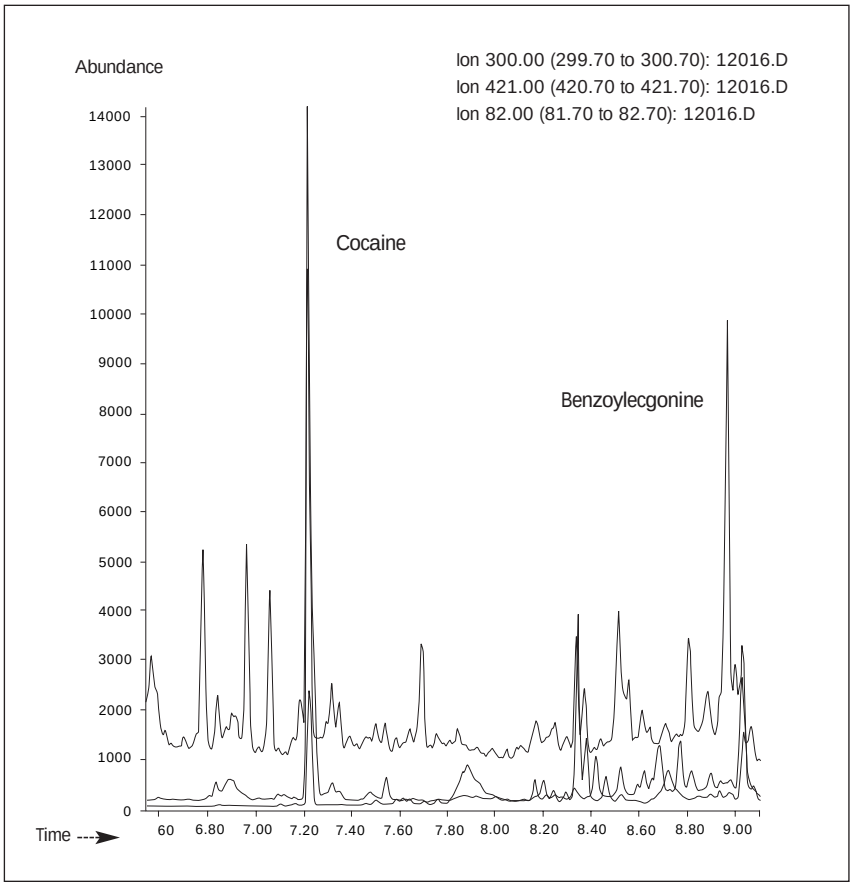
Drug	Cocaine
Classification:	Stimulant
CSA Schedule:	Schedule II
Trade or Other Names:	Coke; Flake; Snow; Crack (Cocaine is designated a narcotic under the CSA)
Medical Uses:	Local anesthetic
Physical Dependence:	Possible
Psychological Dependence:	High
Tolerance:	Yes
Duration (hours):	1-2
Usual Method:	Sniffed; Smoked; Injected
Possible Effects:	Increased alertness; Excitation; Euphoria; Increased pulse rate and blood pressure; Insomnia; Loss of appetite
Effects of Overdose:	Agitation; Increased body temperature; Hallucinations; Convulsions; Possible death
Withdrawal Syndrome:	Apathy; Long periods of sleep; Irritability; Depression; Disorientation



Instrument: HP 5890 Series II Gas Chromatograph / 5971 Mass Spectrometer
Column: DB-1 (J&W Scientific), 15 m x 0.25 mm x 0.25 µm
Injection Port Temperature: 250˚ C
Transfer Line Temperature: 300˚ C
Oven Temperatures:
Initial: 100˚ C for 1 min.
Ramp 1: 20˚ C / min to 260˚ C
Final: 260˚ C

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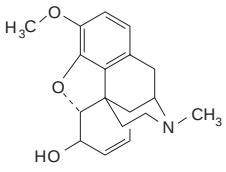
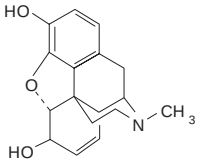
Codeine and Morphine in Urine by GC/MS using Waters Oasis® MCX 3 cc (60 mg) Sample Extraction Column and Zymark Rapid Trace™



Codeine



Morphine

1. Enzymatic Hydrolysis

- Place 3.0 ml of urine in an appropriate tube.
- Add internal standard (suggested IS: D-3 codeine and D-3 morphine)
- Add 500 µl of sodium acetate buffer & 100 µl of B-glucuronidase.
- Cap and vortex.
- Incubate at 55 ˚C 1 hour.

2. Sample preparation

- Allow sample to cool.
- Add 1 ml of de-ionized water to each sample.
- Add 100 µl of 12 M NaOH & 300 µl of 1.5 M carbonate buffer.
- Mix sample and centrifuge. Transfer the supernatant to a clean tube.

3. Load

Load 3.0 ml of sample onto the column at a rate of 2 ml/min..

4. Rinse column

- 2.0 ml of 0.15 M Carbonate buffer (pH 9.5) at a rate of 2 ml/min.
- 2.0 ml of de-ionized water at a rate of 8 ml/min.
- Purge cannula with 6 ml of water at a rate of 30 ml/min. Rapid Trace™ only
- 4.0 ml of hexane at a rate of 8 ml/min.

5. Elute

Elute with 3 ml of 2-propanol/methylene chloride (75/25), at a rate of 2 ml/min.

6. Evaporate

Evaporate eluant under nitrogen at 50 ˚C.

7. Derivatize

- Add 200 µl of propionic anhydride & 200 µl of pyridine.
- Cap and mix. React at 75 ˚C for 30 min.
- Evaporate to dryness at 50 ˚C.
- Reconstitute with 50 µl of ethyl acetate.

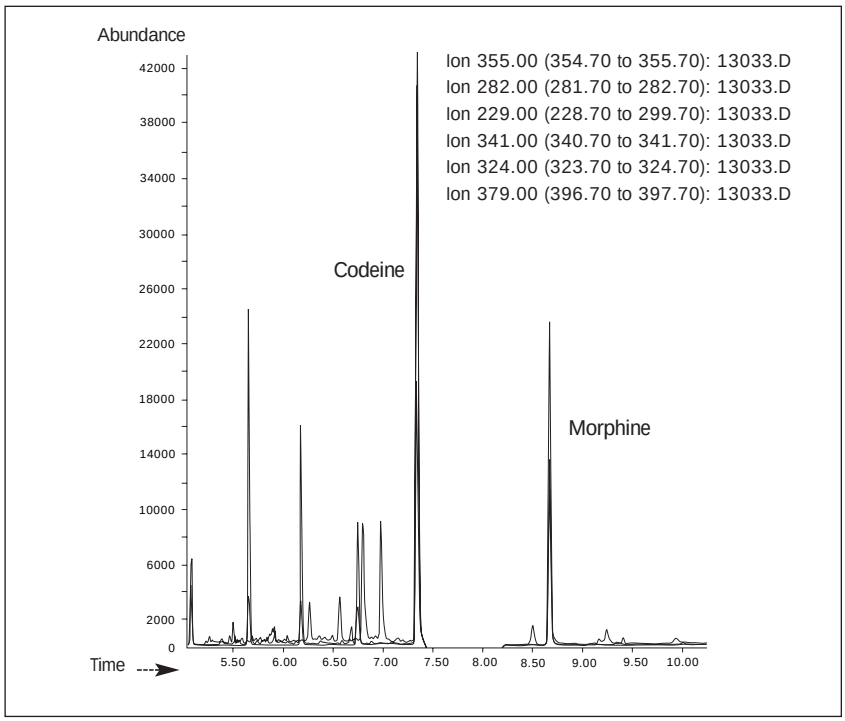
8. Quantitation: Monitor ions

- Codeine: 355 (Quant. ion), 282, 229
- D-3 Codeine: 358 (Quant. ion), 285, 232
- Morphine: 341 (Quant. ion), 324, 397}
- D-3 Morphine: 344 (Quant. ion), 400, 327

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Drug	Codeine
Classification:	Narcotic
CSA Schedule:	Schedule II, III, V
Trade or Other Names:	Tylenol w/Codeine; Empirin w/Codeine; Robitussin A-C; Fiorinal w/Codeine; APAP w/Codeine
Medical Uses:	Analgesic; Antitussive
Physical Dependence:	Moderate
Psychological Dependence:	Moderate
Tolerance:	Yes
Duration (hours):	3-6
Usual Method:	Oral; Injected
Possible Effects:	Euphoria; Drowsiness; Respiratory depression; Constricted pupils; Nausea
Effects of Overdose:	Slow and shallow breathing; Clammy skin; Convulsions; Coma; Possible death
Withdrawal Syndrome:	Watery eyes; Runny nose; Yawning; Loss of appetite; Irritability; Tremors; Panic; Cramps; Nausea; Chills and sweating

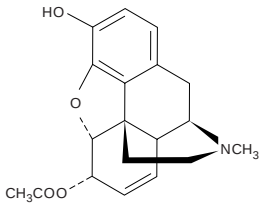
Drug	Morphine
Classification:	Narcotic
CSA Schedule:	Schedule II
Trade or Other Names:	Duramorph; MS-Contin; Roxanol; Oramorph SR
Medical Uses:	Analgesic
Physical Dependence:	High
Psychological Dependence:	High
Tolerance:	Yes
Duration (hours):	3-6
Usual Method:	Oral; Smoked; Injected
Possible Effects:	Euphoria; Drowsiness; Respiratory depression; Constricted pupils; Nausea
Effects of Overdose:	Slow and shallow breathing; Clammy skin; Convulsions; Coma; Possible death
Withdrawal Syndrome:	Watery eyes; Runny nose; Yawning; Loss of appetite; Irritability; Tremors; Panic; Cramps; Nausea; Chills and sweating



Instrument: HP 5890 Series II Gas Chromatograph / 5971 Mass Spectrometer
Column: DB-1 (J&W Scientific), 15 m x 0.25 mm x 0.25 µm
Injection Port Temperature: 250˚ C
Transfer Line Temperature: 290˚ C
Oven Temperatures:
Initial: 100˚ C for 3 min.
Ramp 1: 30˚ C/min to 180˚ C
Ramp 2: 10˚ C/min to 265˚ C
Ramp 3: 30˚ C/min to 300˚ C
Final: 300˚ C for 1 min hold

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

6-Monoacetyl-morphine in Urine by GC/MS using Waters Oasis® MCX 3 cc (60 mg) Sample Extraction Column and Zymark Rapid Trace™



6-Monoacetyl-morphine

1. Sample preparation

- Place 3.2 ml of urine in an appropriate tube.
- Add 32 µl of 5N HCl and internal standard (suggested IS: D-6, 6-Monoacetyl-morphine).

2. Load

Load 3.0 ml of sample onto the column at a rate of 2 ml/min.

3. Rinse column

- 2.0 ml of 0.15 M carbonate buffer pH 9.3 at a rate of 2 ml/min.
- 2.0 ml of de-ionized water at a rate of 8 ml/min.
- Purge cannula with 6 ml of water at a rate of 30 ml/min. Rapid Trace™ only
- 4.0 ml of hexane at a rate of 8 ml/min.

4. Elute

Elute with 3 ml of 2-propanol/methylene chloride (75/25), at a rate of 2 ml/min.

5. Evaporate

Evaporate eluant under nitrogen at 50 °C.

6. Derivatize

- Add 30 µl of ethyl acetate.
- Add 15 µl of MSTFA (N-methyl-N-(trimethylsily)trifluoroacetamide).
- Vortex.

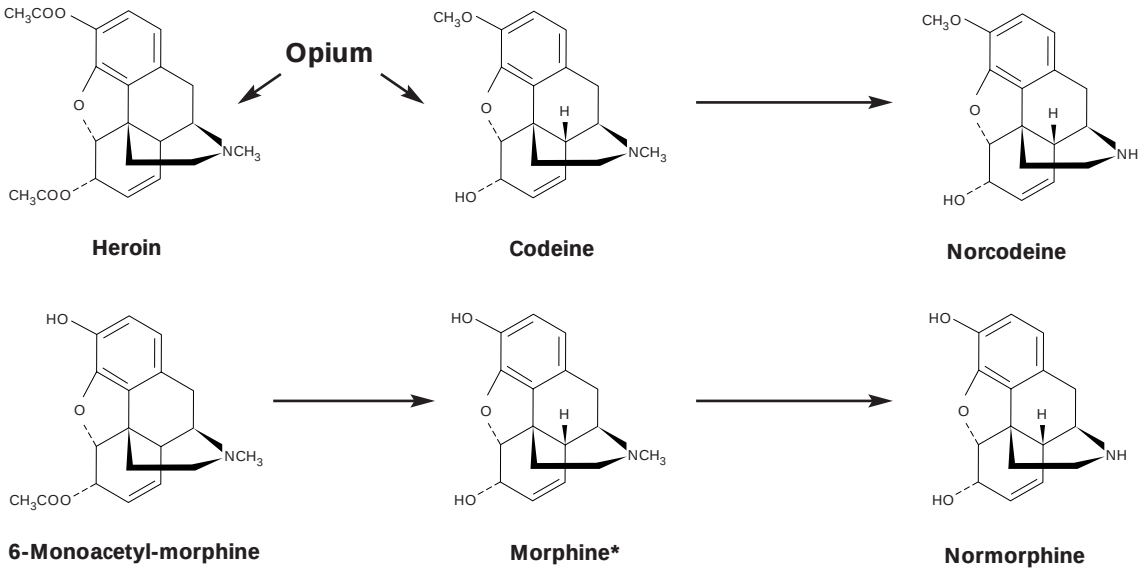
7. Transfer to autosampler vials

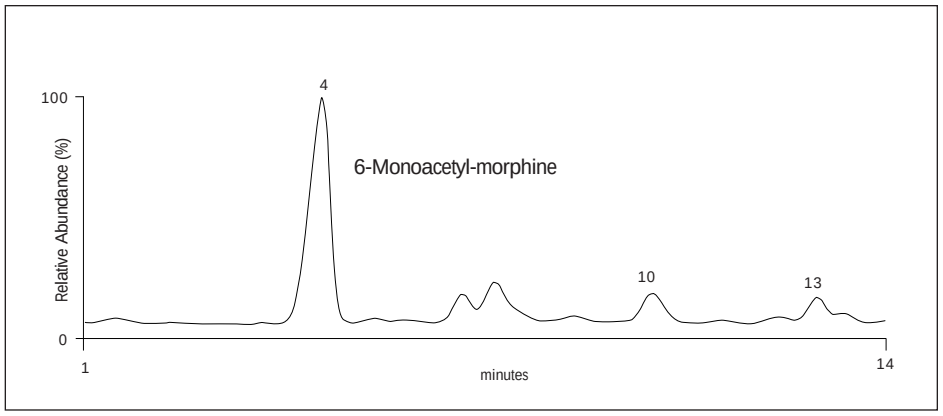
8. Quantitation: Monitor ions

- 6-Monoacetyl-morphine, 399 (Quant ion), 340, 287
- D-6, 6-Monoacetyl-morphine, 405 (Quant. ion), 343, 290

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Opiate Metabolism

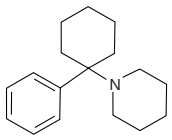




Instrument: Shimadzu 17A Gas Chromatograph / QP5000 Mass Spectrometer
Column: RTX-1 (Restek), 10 m x 0.18 mm x 0.20 µm
Injection Port Temperature: 250˚ C
Transfer Line Temperature: 300˚ C
Oven Temperatures:
Initial: 100˚ C for 1 min.
Ramp 1: 30˚ C / min to 300˚ C
Final: 300˚ C for 1 min.

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Phencyclidine in Urine by GC/MS using Waters Oasis® MCX 3 cc (60 mg) Sample Extraction Column and Zymark Rapid Trace™



Phencyclidine

1. Sample preparation

- Place 3.2 ml of urine in an appropriate tube.
- Add 32 µl of 5N HCl and internal standard (suggested IS: D-5 Phencyclidine).

2. Load

Load 3.0 ml of sample onto the column at a rate of 2 ml/min.

3. Rinse column

- 2.0 ml of 0.1 N NaOH at a rate of 2 ml/min.
- 2.0 ml of de-ionized water at a rate of 8 ml/min.
- Purge cannula with 6 ml of water at a rate of 30 ml/min. Rapid Trace™ only
- 4.0 ml of hexane at a rate of 8 ml/min.

4. Elute

Elute with 3 ml of 2-propanol/methylene chloride (75/25), at a rate of 2 ml/min.

5. Evaporate

Evaporate to dryness under nitrogen at 50 ˚C.

6. Reconstitute

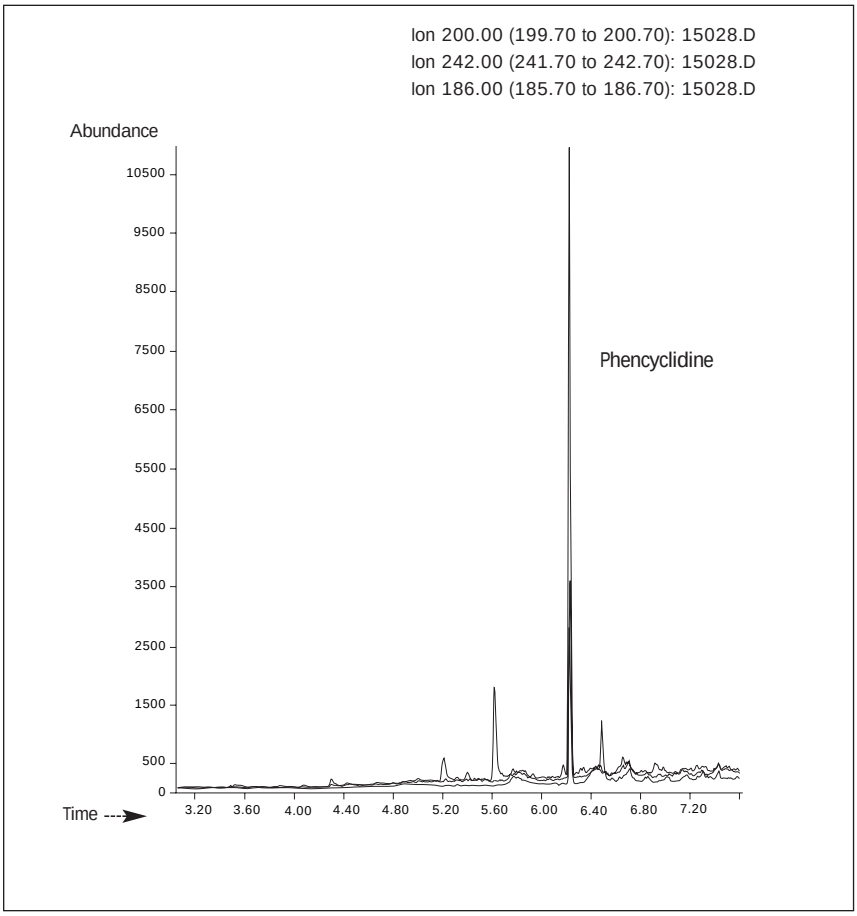
- Add 50 µl of ethyl acetate. Vortex

7. Quantitation: Monitor ions

- Phencyclidine: 200 (Quant ion), 242, 186
- D-5 Phencyclidine: 205 (Quant. ion), 247, 191

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Drug	Phencyclidine
Classification:	Hallucinogen
CSA Schedule:	Schedule I, II
Trade or Other Names:	PCE; PCPy; TCP; PCP; Hog; Loveboat; Angel Dust
Medical Uses:	None
Physical Dependence:	Unknown
Psychological Dependence:	High
Tolerance:	Yes
Duration (hours):	Days
Usual Method:	Oral; Smoked
Possible Effects:	Illusions and hallucinations; Altered perception of time and distance
Effects of Overdose:	Longer, more intense “trips” episodes; Psychosis; Possible death
Withdrawal Syndrome:	Unknown



Instrument: HP 5890 Series II Gas Chromatograph / 5971 Mass Spectrometer
Column: DB-1 (J&W Scientific), 15 m x 0.25 mm x 0.25 µm
Injection Port Temperature: 250˚ C
Transfer Line Temperature: 300˚ C
Oven Temperatures:
Initial: 100˚ C for 1 min.
Ramp 1: 20˚ C/min to 230˚ C
Final: 230˚ C

Oasis® for Forensic LC and LC/MS Applications

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

General Oasis® MCX Solid-Phase Extraction Method for Acidic Neutral & Basic Compounds

1. Condition Oasis® cartridge

- 2 mL MEOH

2. Equilibrate

- 2 ml H_2O

3. Load

- 3 mL Acidified diluted urine/plasma onto Oasis® column at 1-2 mL/min.

4. Wash 2

- 2 mL-0.1N HCl

5. Wash 3 or Elute A

- 2 mL MEOH (Collect for Acid Neutral compounds)

6. Elute B

- 2 mL ammoniated Methanol (5% NH_4OH in Methanol)

7. Evaporate

- Evaporate @ 40° C , derivatize and reconstitute in appropriate solvent

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Suggested Generic ABN Solid-Phase Extraction Method for Oasis® MCX (Whole Blood)

Extracting Acidic, Neutral and Basic drugs from Whole blood using Vac RC LP 20 cc/60 mg Oasis® MCX cartridges.

1. Prepare Sample

- Prepare whole blood (1.0 mL) by adding deuterated internal Standard)
- Dilute (9 mL) 0.1M KH_2PO_4 (or other acidic buffer)
- Vortex and centrifuge @ 3K RPM. Collect supernatant and transfer to conditioned Oasis® MCX Cartridge

2. Condition Oasis® cartridge

- 2 mL MEOH

3. Equilibrate Oasis® cartridge

- 2 mL H_2O (Phosphate Buffer can be used)

4. Load

- Supernatant onto Oasis® column at 1-2 mL/min.

5. Wash 1

- 2 mL- H_2O (Try 2 x 1 mL)

6. Wash 2

- 2 mL- 0.1N HCl
  (Removes proteins and non-retained aqueous materials Protonates Bases)

7. Wash 3

- 2 mL - 5% MEOH in H_2O

8. Dry

- 4 min (increase vacuum 15 mm, Hg)

9. Elute A*

- 2 mL - 2 mL ETOH or (70/30 ACN/MEOH)
  (Removes acidic and neutral drugs)

10. Elute B

- 2 mL - 5% NH_4OH in ethanol or (5% ammoniated Ethyl Acetate) Removes basic drug(s)

11. Dry

- For GC/MS, dry fractions over $NaSO_4$

12. Evaporate

- @ 40° C , derivatize and reconstitute in appropriate solvent

*** Note: For Acid/ Neutral compounds Collect Eluent A otherwise treat as wash**

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Solid-Phase Extraction Method for Oasis® MCX (Tissue Homogenate)

Procedure for extracting Basic drugs from Tissue homogenate using 6 cc/150 mg LP Oasis® MCX cartridges.

1. Prepare Sample

- Prepare Tissue homogenate (5.0 g) by diluting with (50-60 mLl) 0.1M KH_2PO_4 (or other buffer), vortex and centrifuge @ 3K RPM.
- Collect supernatant (Filter*) and transfer to conditioned Oasis® MCX Cartridge with 60 mL reservoir attached

  * Filter if necessary, 0.45 micron filter

2. Condition Oasis® cartridge

- 2 mL MEOH

3. Equilibrate

- 2 mL Phosphate Buffer

4. Load

- Supernatant at 4-5ml/min.

5. Wash 1

- 4mL- H_2O (Try 2 x 2 mL)

6. Wash 2

- 4mL- 0.1N HCl
  (Removes proteins and non-retained aqueous materials Portonates Bases)

7. Wash 3

- 4 mL - 5% MEOH in H_2O

8. Wash 4

- 4 mL -70:30 ACN/MEOH)
  (Removes acidic and neutral drugs)

9. Elute 2

- 1. 2 mL -5% NH_4OH in 70:30 ACN/MEOH)
  (Elutes the basic drug(s)

10. Evaporate

- @ 40° C and reconstitute in appropriate solvent

Note: No stopcock needed, turn vacuum on add MEOH then add buffer!

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Acidic Veterinary Drugs in Horse Urine LC/MS

LC/MS Results peak area (± %RSD) n = 6

Compound	0.1 ppm	0.4 ppm	2.0 ppm	10.0 ppm	r^2
ketoprofen	4804(4.7)	26389(11)	129366(9.6)	525903(8.1)	0.998
naproxen	7621(8.8)	40234(23)	231980(12)	875595(7.3)	0.995
phenylbutazone	778(7.8)	4252(37)	39387(15)	207163(5.6)	0.999
ibuprofen	820(6.1)	3739(14)	23489(7.9)	127731(5.7)	0.999
meclofenamic acid	2070(11)	9531(23)	38822(11)	—	0.998

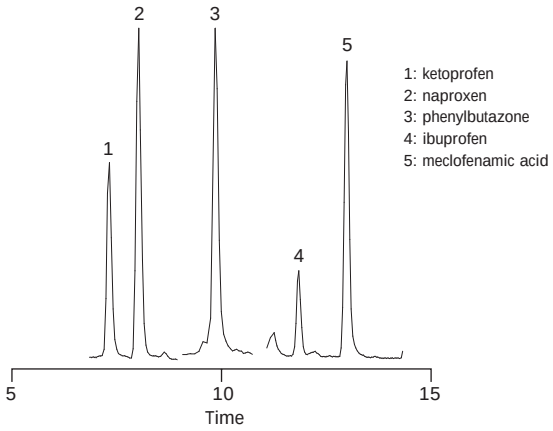
For LC/PDA Results see page 27

LC/MS Conditions

Instrument: Waters Alliance™ Separations Module with 996 PDA
Column: Waters XTerra® MS C_{18}, 2.1 x 100 mm, (3.5 µm dP)
Mobile Phase: A: 20 mM ammonium acetate (pH 4)
B: methanol
Gradient: 50% A initial, to 90% methanol in 10 min
Flow Rate: 175 µL/min
Inj Volume: 10 µL

Results obtained using negative electrospray MS, 37 V cone voltage), SIR mode

Reconstructed TIC Chromatogram



Oasis® Method

Oasis® MAX, 6 cc (150 mg)
Extraction Cartridge

Prepare Sample

Hydrolysis
- add 1 mL of 10M KOH to 10 mL of spiked urine.
- heat at 60° for 15 minutes.
- allow to cool to room temperature
- adjust to pH 2 with H_3PO_4.
- dilute 1:1 with reagent water

Condition

3 mL each: MTBE/MeOH/H_2O

Load

10 mL diluted urine onto Oasis® cartridge
1-2 mL/min

Wash 1

3 mL 50 mM NaOAc (pH 7)

Wash 2

4 mL methanol

Elutes

4 mL MTBE/MeOH/TFA (89:10:1)

Evaporate and Reconsitute

Nitrogen @ 45° C

MTBE - methyl t-butyl ether
TFA - trifluoroacetic acid

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Acidic Veterinary Drugs in Horse Urine LC/PDA

LC/PDA Results % Recovery ± (%RSD) n = 6

Compound	0.4 ppm	2.0 ppm	10.0 ppm
ketoprofen[1]	*	88 (5.0)	92 (2.5)
naproxen[2]	92 (3.7)	91 (6.1)	89 (1.1)
phenylbutazone[1]	67 (4.0)	75 (6.9)	71 (3.4)
ibuprofen[2]	**	80 (9.5)	86 (2.8)
meclofenamic acid[3]	72 (6.6)	68 (6.6)	74 (8.0)

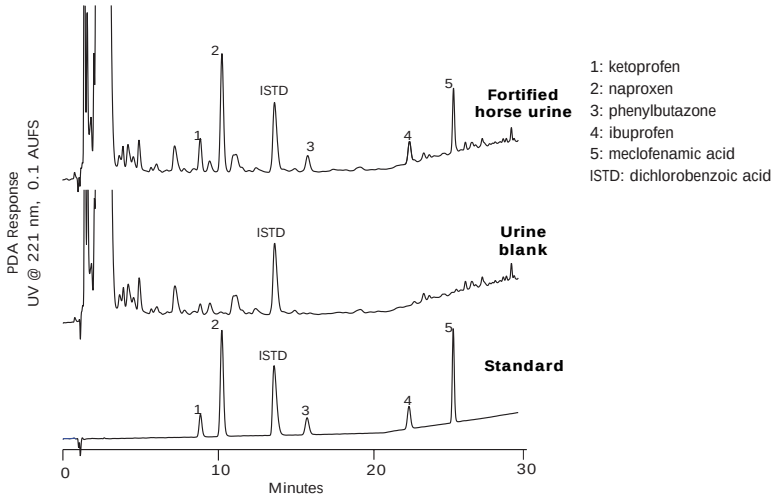
1 results at 243 nm, 2 results at 221 nm, 3 result at 276 nm,
*blank interference > 30% of spike response **result below LOQ

For LC/MS Results see page 26

LC Conditions

Instrument: Waters Alliance™ Separations Module with 996 PDA
Column: Waters XTerra™ MS C_{18}, 4.6 x 100 mm, (3.5 µm dP)
Mobile Phase: A: 0.1% acetic acid B: methanol
Gradient: 50% A for 2 min, to 60% methanol in 20 min, to 90% methanol in 30 min
Flow Rate: 1.0 mL/min
Inj Volume: 40 µL

LC/PDA Analysis, 2 ppm



1: ketoprofen
2: naproxen
3: phenylbutazone
4: ibuprofen
5: meclofenamic acid
ISTD: dichlorobenzoic acid

Oasis® Method

Oasis® MAX, 6 cc (150 mg)
Extraction Cartridge

Prepare Sample

Hydrolysis
- add 1 mL of 10M KOH to 10 mL of spiked urine.
- heat at 60° for 15 minutes.
- allow to cool to room temperature
- adjust to pH 2 with H_3PO_4.
- dilute 1:1 with reagent water

Condition

3 mL each: MTBE/MeOH/H_2O

Load

10 mL diluted urine onto Oasis® cartridge
1-2 mL/min

Wash 1

3 mL 50 mM NaOAc (pH 7)

Wash 2

4 mL methanol

Elutes

4 mL MTBE/MeOH/TFA (89:10:1)

Evaporate and Reconsitute

Nitrogen @ 45° C

MTBE - methyl t-butyl ether
TFA - trifluoroacetic acid

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

LC/MS Analysis of 35 Drugs in Human Whole Blood by Solid Phase Extraction

Compound	Concentration µg/mL	% Recovery (n=3)	Monitor ion
Acetaminophen	0.04	104 ± 2.8	150.1(-)
Alprazolam	0.19	101 ± 2.5	309.3
Bromazepam	0.20	90.2 ± 8.8	316.1
Bromvalerylurea	2.00	94.5 ± 10.2	223.1
Carbamazepine	0.52	102 ± 3.4	237.2
Chlordiazepoxide	0.20	70.8 ± 10.7	300.3
Chlorpromazine	0.30	105 ± 2.8	319.3
Clotiazepam	0.27	101 ± 3.4	319.1
Cocaine	0.25	102 ± 4.3	304.3
Diazepam	0.30	100 ± 4.2	285.2
Ethenzamide	0.27	103 ± 3.1	166.1
Etizolam	0.24	100 ± 1.5	343.3
Estazolam	0.10	98.5 ± 3.4	295.5
Flunitrazepam	0.21	104 ± 3.2	314.3
Flutazolam	0.25	104 ± 2.8	377.3
Haloperidol	0.10	101 ± 2.9	376.4
Haloxazolam	0.25	32.0 ± 12.4	378.2
Imipramine	0.37	84.3 ± 6.9	281.4
Lidocaine	0.20	100 ± 5.4	253.3
Levomepromazine	0.25	84.8 ± 10.0	329.2
Methamphetamine	0.26	70.0 ± 13.7	150.2
Morphine	0.30	93.2 ± 3.6	286.4
Nitorazepam	0.23	104 ± 3.8	282.2
Oxazolam	0.45	70.1 ± 10.2	329.5
Perphenazine	0.20	45.2 ± 8.9	404.4
Phenobarbital	0.42	100 ± 2.7	231.1(-)
Promethazine	0.10	70.0 ± 9.8	285.2
Propericiazine	0.20	57.8 ± 5.8	366.4
Sultopride	0.45	98.2 ± 3.4	355.4
Triazolam	0.13	92.8 ± 5.6	343.1
4-OH-Triazolam	0.10	72.0 ± 6.8	359.1
α-OH-Triazolam	0.10	68.8 ± 10.6	359.1
Trihexyphenidyl	0.13	89.9 ± 9.4	302.5
Zotepine	0.38	71.2 ± 6.1	332.4

Recovery: Average ± Range

Oasis® HLB Extraction Method

Oasis® HLB 1 cc/30 mg Extraction Cartridge (WAT094225) or 3 cc/60 mg (WAT094226)

Condition

1 mL methanol/1 mL water

Load

1 mL whole human blood

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconsititute

Filled up to 1 mL with methanol
filtrate with 0.45 µm membrane filter

Better recoveries can be obtained for some compounds using Oasis® MCX for basic, and Oasis® MAX for acidic drugs.

LC/MS Method

System:	Alliance™-Platform LCZ system
Column:	L-column ODS
Temperature:	40° C
Injection:	5 µL
Mobile Phase:	A: Methanol
	B: 10 mM ammonium acetate
Gradient:	A:B=60:40 - 90:10/40 min
Flow Rate:	0.15 mL/min
Ionization:	ESI
Scan Mode:	SIR
Cone Voltage:	30V
Capillary Voltage:	3.10kV

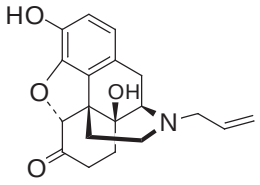
Data supplied by Mr. Fujita, Forensic Science Laboratory of Toyama Prefectural Police Headquarters, Toyama, Japan

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

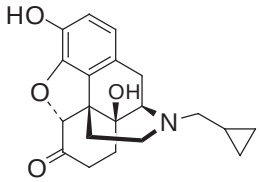
Antagonist (narcotic): Naltrexone

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Naltrexone	0.200	98%	3.2%
	1.00	100%	3.5%

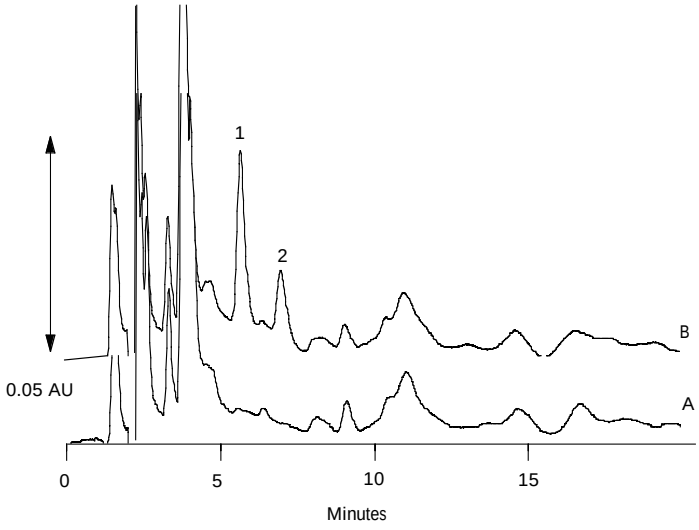
Naloxone (I.S.)



Naltrexone



Chromatogram of Serum Extracts: A) Blank B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc / 30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol / 1 mL water

Load

1 mL spiked porcine serum with 0.2 µg naloxone (I.S.)

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconstitute

40˚ C under nitrogen stream
200 µL mobile phase

HPLC Method

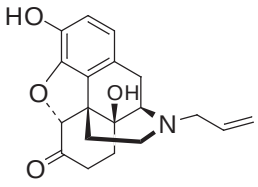
Column:	SymmetryShield™ RP_8, 5 µm, 3.0 mm x 150 mm with Sentry™ guard column, 3.9 mm x 20 mm
Sample:	20 µL of reconstituted porcine serum extract
Mobile phase:	20 mM ammonium acetate, pH 5 / acetonitrile, 90:10 (v / v)
Flow rate:	0.6 mL / min
Temperature:	25 ˚C
Detection:	215 nm
Peaks:	1: Naloxone (I.S.) 2: Naltrexone

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

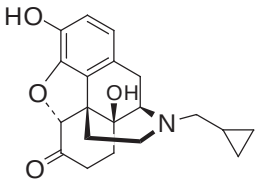
Naltrexone in Plasma

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Naltrexone	3.3	108%	4.2%

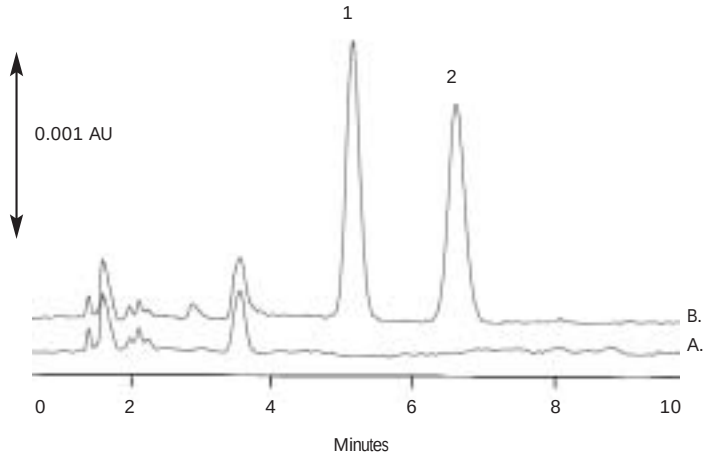
Naloxone (I.S.)



Naltrexone



Chromatogram of Plasma Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc / 30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol / 1 mL water

Load

1 mL spiked plasma with naloxone (I.S.)

Wash

1) 1 mL 5% methanol containing 2% ammonium hydroxide
2) 1 mL 20% methanol containing 2% ammonium hydroxide

Elute

0.5 mL of 25% methanol containing 2% acetic acid

Evaporate and Reconstitute

Not Required

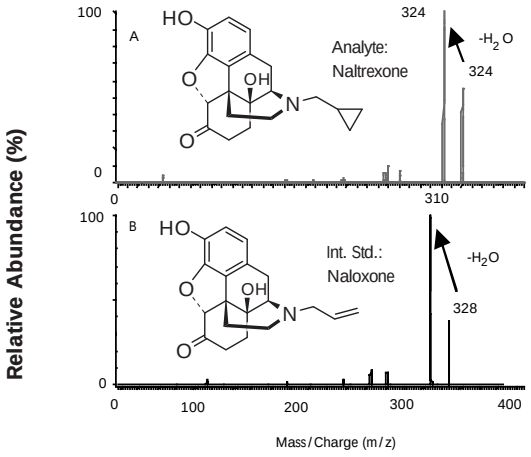
HPLC Method

Column:	SymmetryShield™ RP_8, 5 µm, 3.9 mm x 150 mm
Sample:	1 mL spiked plasma with naloxone (I.S.)
Mobile phase:	100 mM ammonium acetate pH 5 / acetonitrile (88:12)
Flow rate:	1.0 mL / min
Temperature:	8° C
Detection:	281 nm
Peaks:	1. Naloxone (I.S.) 2. Naltrexone Sample

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

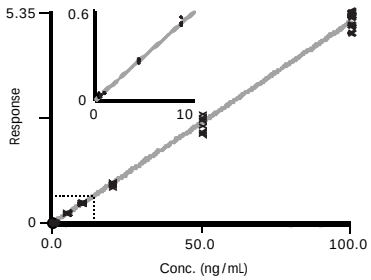
LC-MS/MS Analysis of Naltrexone in Porcine Plasma

CID mass spectra



Naltrexone m/z 342 > 324
Naloxone m/z 328 > 310

Coefficient of Determination: 0.996457
Calibration Curve: 0.0508208* x + 0.00306776
Response type: Internal Std (20 ng/mL Naloxone), Area * (IS Conc. / IS Area)
Curve type: Linear, Origin: Exclude, Weighting: 1x, Axis trans: None



HPLC:	Waters Alliance® 2690
Column:	Symmetry® C_8 column, 3.5 µm, 2.1 mm x 30 mm
Flow rate:	200 µL/min
Mobile phase:	88% 10 mM NH_4OH, pH 5, 12% acetonitrile
Injection:	50 µL plasma extract
MS:	Micromass Quattro® II
Ion Source Temp:	120 ˚C
CID:	1.8e-3 mBar, 20 eV
Desolvation Temp:	400˚ C
Nebulizer:	40 L/hr
Drying gas:	400 L/hr
Cone volt:	56 V

Oasis® HLB Extraction Method

Oasis® HLB Extraction Plate, 30 mg 96-well
Part Number WAT058951

Condition

1 mL methanol/1 mL water

Loading

1 mL spiked plasma

Wash

1 mL 5% methanol/2% ammonium hydroxide

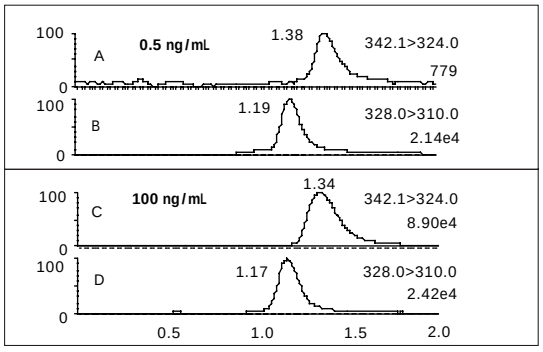
Elution

0.5 mL 25% methanol/1% acetic acid

Dilution

0.5 mL water

HPLC-MS/MS (MRM Analysis at 0.5 ng/mL and 100 ng/mL



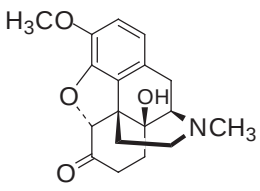
Conc ng/mL N=8	Average	% Std. Dev	(RSD%)	(rel. error)
0.5	0.6	0.09	16	15
1	0.9	0.06	6	-14
5	5.1	0.2	4	3
10	10.1	0.4	4	1
20	19.7	0.8	4	-2
50	49.1	3.9	8	-2
100	101.1	3.7	4	1

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

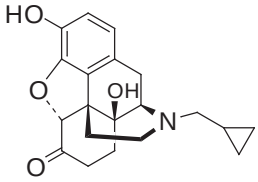
Analgesic (narcotic): Oxycodone

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Oxycodone	0.200	96.0%	6.4%
	1.00	97.9%	1.0%

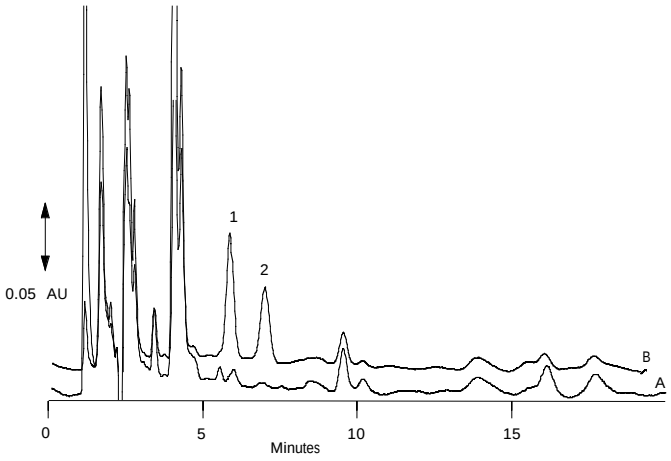
Oxycodone



Naltrexone (I.S.)



Chromatogram of Serum Extracts: A) Blank B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc / 30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol / 1 mL water

Load

1 mL spiked porcine serum with
0.2 µg naloxone (I.S.)

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconstitute

40˚ C under nitrogen stream 200 µL mobile phase

HPLC Method

Column: SymmetryShield™ RP_8, 5 µm
3 mm x 150 mm,
with Sentry™ RP_8, 5 µm guard column,
3.9 mm x 20 mm

Sample: 20 µL of reconstituted porcine serum extract

Mobile phase: 20 mM ammonium acetate, pH 5 / acetonitrile, 90:10 (v/v)

Flow rate: 0.6 mL / min

Temperature: 25 ˚C

Detection: 215 nm

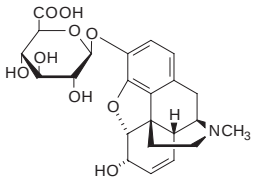
Peaks: 1: Oxycodone
2: Naltrexone (I.S.)

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

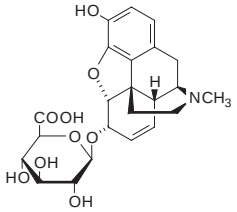
Morphine and Its Glucuronide Metabolites

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Morphine-3-glucuronide	0.48	90.7	2.0
	0.097	100	3.1
Morphine-6-glucuronide	2.4	92.2	2.8
	0.49	93.1	2.5
Morphine	3.6	102	3.6
	0.73	102	3.2

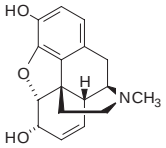
Morphine-D3-glucuronide



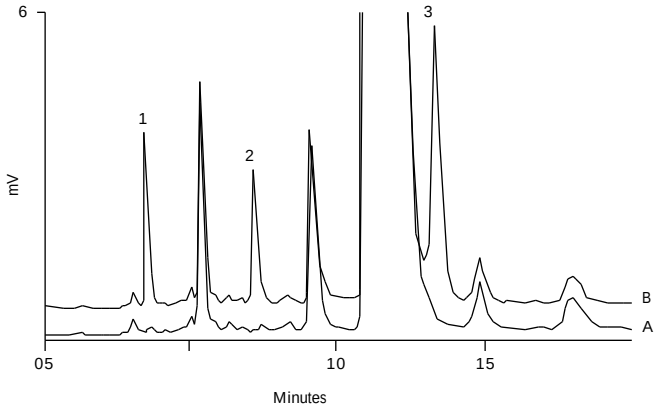
Morphine-D6-glucuronide



Morphine



Chromatogram of Serum Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc / 30 mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol

Equilibrate

1 mL water

Load

1 mL spiked porcine serum

Wash

1 mL water

Elute

0.5 mL 3% triethylamine

No Evaporation

Sample injection directly

HPLC Method

Column: SymmetryShield™ RP_8, 5 µm, 3 9 mm x 150 mm
Sample: 100 µL of porcine serum extract
Mobile phase: 20mM potassium phosphate, pH 6.4
Flow rate: 1.0 mL / min
Detection: Fluorescence; ex 280 nm, em 355 nm

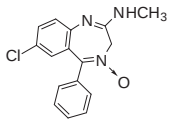
Peaks:
1: Morphine-D3 glucuronide
2: Morphine-D6 glucuronide
3: Morphine

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

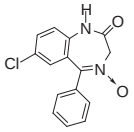
Sedative: Chlordiazepoxide and Metabolites

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Norchlordiazepoxide	0.200	97.8%	4.3%
	0.040	96.5%	5.5%
Oxazepam	0.200	104.0%	2.6%
	0.040	90.0%	2.5%
Desmethyldiazepam	0.200	101.0%	3.0%
	0.040	98.9%	1.2%
Chlordiazepoxide	0.200	90.0%	2.4%
	0.040	100.0%	4.1%

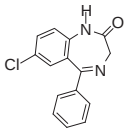
Chlordiazepoxide
pka 4.8



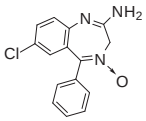
Demoxepam (I.S.)



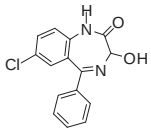
Nordiazepam
(= Nordazepam)



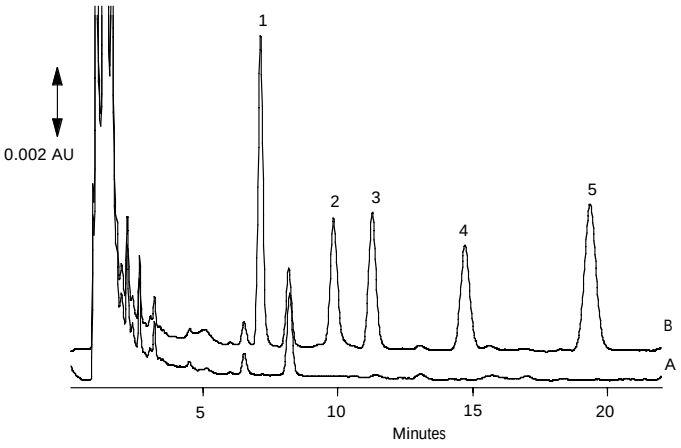
Norchlordiazepoxide



Oxazepam
pka 1.7 and 11.6



Chromatogram of Serum Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc/30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol/1 mL water

Load

1 mL spiked porcine serum with
1.5 µg/mL demoxepam (I.S.)

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconstitute

40˚ C under nitrogen stream 200 µL of 20 mM potassium phosphate pH 7/methanol 80:20 (v/v)

HPLC Method

Column: Symmetry® C_{18}, 5 µm, 3.9 mm x 150 mm with Sentry™ guard column, 5 µm, 3.9 mm x 20 mm
Sample: 20 µL of reconstituted porcine serum extract
Mobile phase: 20 mM potassium phosphate, pH 7/acetonitrile/methanol 56:21:23 (v/v/v)
Flow rate: 1.0 mL/min
Detection: UV at 240 nm

Peaks:
1: Norchlordiazepoxide
2: Oxazepam
3: Nordiazepam
4: Chlordiazepoxide
5: Demoxepam (I.S.)

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

Benzodiazepine: Diazepam

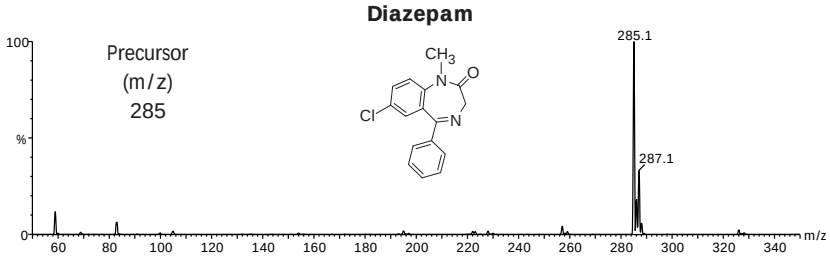


Figure 1: Background-subtracted electrospray mass spectrum of pure diazepam standard (5ng), under optimum conditions. Chromatographed as described above to remove contaminants.

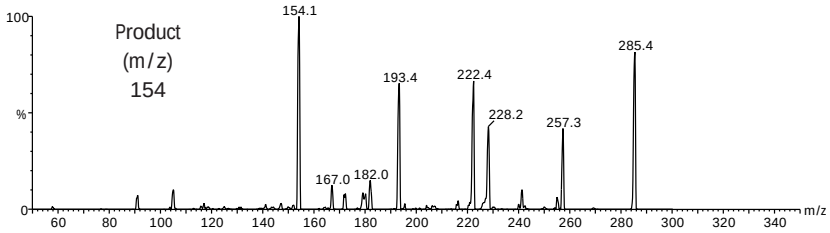


Figure 2: Background-subtracted electrospray product ion spectrum of pure diazepam standard (5ng), under optimum conditions. Chromatographed as described above to remove contaminants.

Compound 3 name: Diazepam
Coefficient of Determination: 0.998439
Calibration curve: 150.210 * x + -0.398957
Response type: External Std, Area
Curve type: Linear, Origin: Exclude, Weighting: 1/x, Axis trans: None

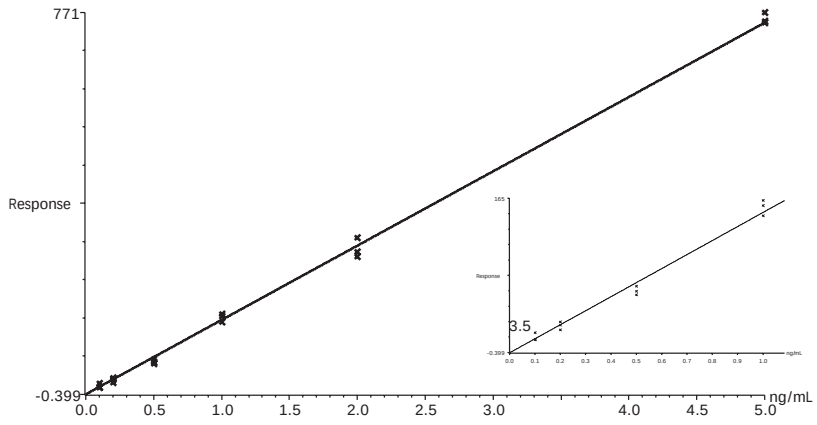


Figure 3: Calibration curve with triplicate injections for each point and demonstrating LOQ at 0.2ng/mL.

Oasis® HLB Extraction Method

Oasis® HLB 1 cc / 30mg Extraction Cartridge
Part Number WAT04225

Condition

1 mL methanol / 1 mL water

Load

1 mL porcine serum

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconstitute

40 ˚C under nitrogen stream,
200 µL mobile phase

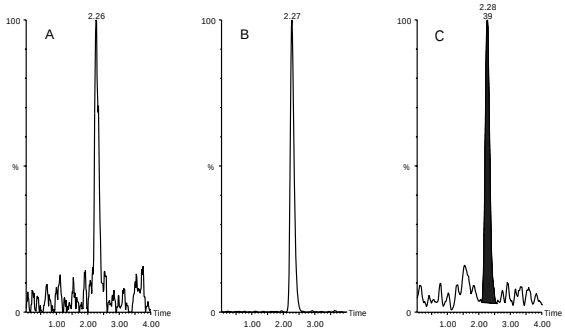


Figure 4: MRM Chromatograms under optimum conditions of pure diazepam standard at (A) 0.2ng/mL (LOD) and (B) 5.0ng/mL and (C) a processed human plasma sample with a low concentration of diazepam (calculated as 0.75ng/mL).

HPLC Method

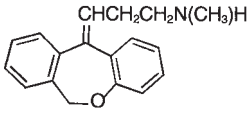
Column:	Symmetry® C_{18}, 3.5 µm, 2.1 mm x 100 mm
Flow:	200 µL / min
Mobile phase:	65% aqueous acetonitrile 2 mM ammonium acetate 0.1% formic acid
Injection:	10 µL
MS:	Micromass Quattro LC
Ion Mode:	ES+
Cone Voltage:	45 V
Collision Energy:	25 eV

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

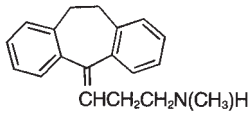
Tricyclic Antidepressants: Doxepin, Amitriptyline, and Metabolites

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Nortriptyline	0.500	99.7%	2.3%
	0.100	105.0%	3.8%
Doxepin	0.500	94.0%	1.3%
	0.100	102.0%	4.6%
Amitriptyline	1.00	102.0%	2.5%
	0.200	104.0%	3.9%

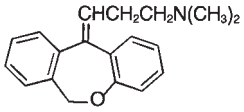
Nordoxepin (I.S.)



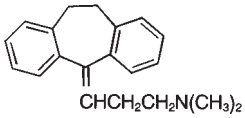
Nortriptyline



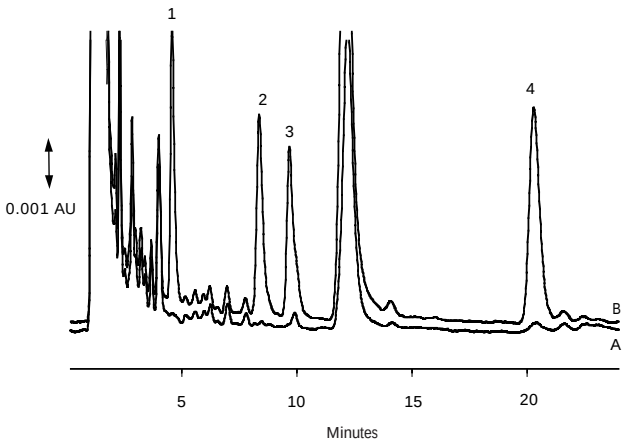
Doxepin



Amitriptyline



Chromatogram of Serum Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc/30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol/1 mL water

Load

1 mL spiked porcine serum with 0.5 µg/mL nordoxepin (I.S.) and 20 µL phosphoric acid

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconstitute

40° C under nitrogen stream 200 µL of mobile phase 20:80 (v/v)

HPLC Method

Column: Symmetry® C_{18}, 5 µm, 3.9 mm x 150 mm with Sentry™ guard column, 5 µm, 3.9 mm x 20 mm
Sample: 20 µL of reconstituted porcine serum extract
Mobile phase: 20 mM potassium phosphate, pH 7/methanol 30:70 (v/v)
Flow rate: 1.0 mL/min
Detection: UV at 254nm

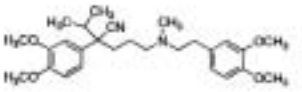
Peaks:
1: Nordoxepin (I.S.)
2: Nortriptyline
3: Doxepin
4: Amitriptyline

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

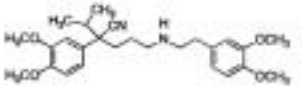
Six Antidepressants in Plasma

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Amitriptyline	1.46	99.9%	1.10%
	0.29	94.9%	0.60%
Doxepin	1.00	98.4%	0.69%
	0.20	98.0%	2.30%
Nordoxepin	0.50	92.8%	0.91%
	0.10	88.0%	1.33%
Nortriptyline	0.62	95.3%	1.29%
	0.12	91.1%	1.03%
Verapamil	2.50	96.7%	0.63%
	0.50	98.8%	0.70%
Norverapamil	1.00	95.9%	0.59%
	0.20	98.5%	1.04%

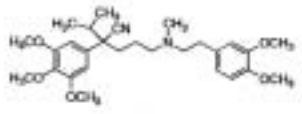
Verapamil



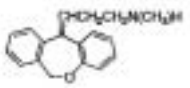
Norverapamil



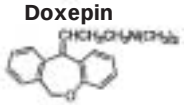
Methoxyverapamil (I.S.)



Nordoxepin



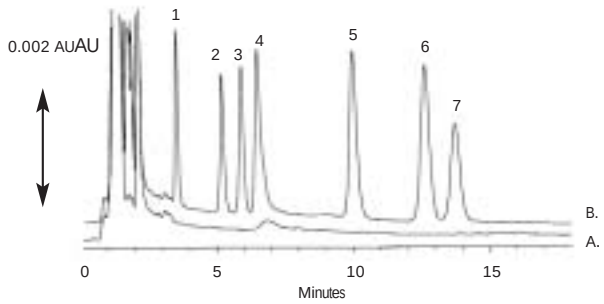
Doxepin



Nortriptyline

Amitriptyline

Chromatogram of Plasma Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc / 30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol / 1 mL water

Load

1 mL of acidified plasma sample solution

Wash

1 mL of 70% methanol, 2% ammonium hydroxide

Elute

0.5 mL of 70% methanol 2% acetic acid

Evaporate and Reconstitute

Not Required

HPLC Method

Column: SymmetryShield™ RP_8, 5 µm, 3.9 mm x 150 mm
Sample: 1mL acidified plasma sample solution
Mobile phase: 100 mM phosphate pH 7 / acetonitrile: methanol (55:35:10)
Flow rate: 1.0 mL / min
Temperature: 30˚ C
Detection: 230 nm

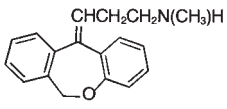
Peaks:
1. Nordoxepin
2. Nortriptyline
3. Norverapamil
4. Doxepin
5. Amitriptyline
6. Verapamil
7. Methoxyverapamil (I.S.)

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

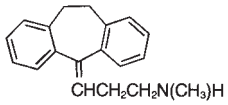
Tricyclic Antidepressants in Plasma

	500 ng/mL		100 ng/mL	
Compound	**Recovery**	**RSD (n=96)**	**Recovery**	**RSD (n=95)**
Nortriptyline	92.3%	1.4%	90.8%	5.7%
Doxepin	90.6%	1.4%	90.4%	4.7%
Imipramine	92.2%	1.7%	86.4%	5.3%
Amitriptyline	90.2%	1.6%	85.3%	5.8%
Trimipramine	90.3%	1.9%	89.8%	6.1%

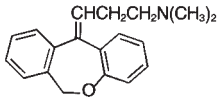
Nordoxepin



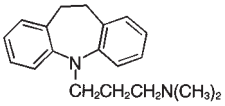
Nortriptyline



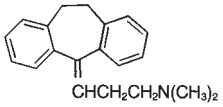
Doxepin



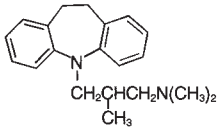
Imipramine



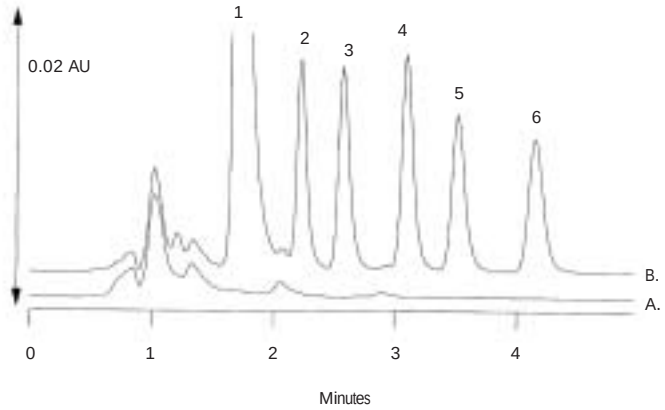
Amitriptyline



Trimipramine



Chromatogram of Plasma Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc/30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol/1 mL water

Load

1 mL spiked plasma plus 20 µL concentrated phosphoric acid

Wash

A. 1 mL 2% ammonium hydroxide in 5% methanol
B. 1 mL 2% ammonium hydroxidein 65% methanol
C. 1 mL 2% acetic acid in 5% methanol

Elute

600 µL 65% methanol

Add internal standard (I.S.) 60 µL 36 µg/mL nordoxepin in 10% ammonium hydroxide

HPLC Method

Column: SymmetryShield™ RP_8, 3.5 µm, 4.6 mm x 75 mm
Sample: 1 mL spiked plasma plus 20 µL concentrated phosphoric acid
Mobile phase: 50 mM phosphate, pH 7/methanol (26:74)
Flow rate: 1.4 mL/min
Temperature: 29° C
Detection: 254 nm

Plasma Extracts

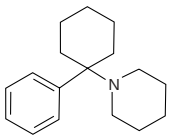
Spiked at 500 ng/mL versus Blank:
1. Nordoxepin (I.S.)
2. Nortriptyline
3. Doxepin
4. Imipramine
5. Amitriptyline
6. Trimipramine

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

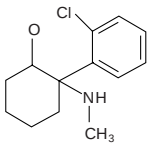
Phencyclidine in Human Urine

Compound	% Recovery (n=6) 0.3 µg/mL	%RSD (n=6) 1.5 µg/mL
Phencyclidine (PCP)	101.7 (2.3)	100.2 (0.8)
Ketamine (I.S.)		86.5 (1.0)
Phencyclidine by G.C.	101.2 (2.3)	100.3 (5.2)

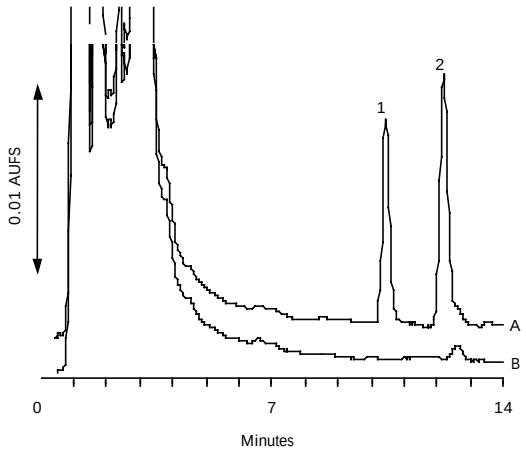
Phencyclidine (PCP)



Ketamine (I.S.)



Chromatogram of Human Urine A) Blank, B) Spiked Sample



Oasis® MCX Extraction Method

Oasis® MCX Extraction Plate 30 mg 96-well
Part Number WAT058951

Load

1 mL of acidified spiked human urine
(4 mL Total Sample)

Wash 1

1 mL 0.1N hydrochloric acid

Wash 2

1 mL methanol

Elute

1 mL 5% ammonium hydroxide
with 95% methanol

HPLC Method

Column: SymmetryShield™ RP_{18}, 5µm, 3.9 mm x 150 mm
Guard Column: SymmetryShield™ RP_{18}, 5µm, 3.9 mm x 20 mm
Mobile phase: 30% acetonitrile 70% 50 mM phosphate buffer, pH 7
Flow rate: 1 mL/min
Temperature: 30˚ C
Detection: UV @ 210 nm (0.01 AUFS)
Injection: 20 µL urine extract

Peaks:
1. Phencyclidine
2. Ketamine HCl

GC Method

Column: DB-5 J&W Scientific, (Cat: # 122-5032)
I.D. 0.25 mm, Film: 0.2 5µm, Length: 30 meters
Oven: 50˚ C to 300˚ C at 15˚ C/min, Hold for 15 min.
Injector: 250˚ C, Splitless
FID: 310˚ C
Injection: 1 µL

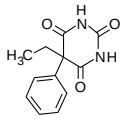
Peaks:
1. Ketamine (I.S.)
2. Phencyclidine (PCP)

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

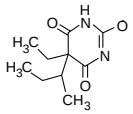
Barbiturates in Human Urine

Compound	%Recovery (n=8) 0.2 µg/mL	(%RSD) (n=8) 1.0 µg/mL
Phenobarbital	114.3 (1.7)	106.5 (0.5)
Butabarbital	95.7 (1.3)	105.5 (0.7)
Butalbital	109.5 (0.9)	104.2 (0.9)
Amobarbital (I.S.)		86.3 (1.7)
Mephobarbital	92.5 (3.6)	92.4 (1.7)
Secobarbital	101.5 (5.2)	94.8 (2.2)

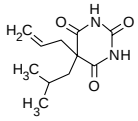
Phenobarbital



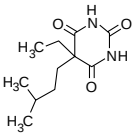
Butabarbital



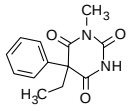
Butalbital



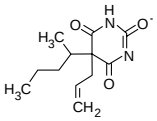
Amobarbital (I.S.)



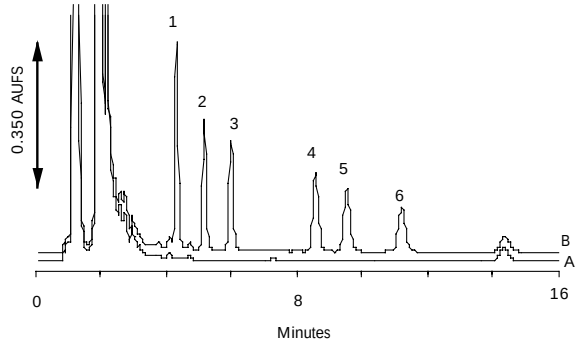
Mephobarbital



Secobarbital



Chromatogram of Serum Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB Extraction Plate, 30 mg 96-well
Part Number WAT058951

Condition

1 mL methanol / 1 mL water

Equilibrate

1 mL water

Load

2 mL water of spiked human urine

Wash 1

1 mL of 5% methanol

Wash 2

1 mL 25% methanol with 2% acetic acid

Elute

1 mL 35% methanol with
2% ammonium hydroxide

Evaporated

To dryness under N_2 at 40˚C

Reconstituted

300 µL of water

HPLC Method

Column:	SymmetryShield™ RP_{18}, 5 µm, 2.1 mm x 150 mm
Guard Column:	SymmetryShield™ RP_{18}, 5 µm, 3.9 mm x 20 mm
Mobile phase:	29% acetonitrile 71% 50.mM potassium phosphate pH = 7.0
Flow rate:	1 mL / min
Temperature:	30˚ C
Detection:	UV @ 214 nm (0.350 AUFS)
Injection:	80 µL urine extract

Peaks

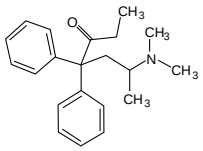
1. Phenobarbital
2. Butabarbital
3. Butalbital
4. Amobarbital (I.S.)
5. Mephobarbital
6. Secobarbital

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

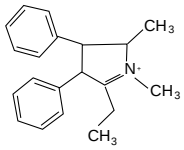
Methadone in Human Urine

Compound	%Recovery n=3 (1 Subject) (3 SPE Washes)	(%RSD) n=9 (3 Subject) (2 SPE Washes)
Methadone (0.5 µg/mL)	95.2 (1.0)	97.4 (3.0)
Methadone (0.1 µg/mL)	98.0 (4.8)	114.7 (8.2)
EDDP (0.2 µg/mL)	93.3 (1.0)	92.9 (2.4)
EDDP (0.4 µg/mL)	98.4 (2.9)	100.5 (5.8)
Estazolam (IS)	94.4 (3.3)	91.2 (91.2)

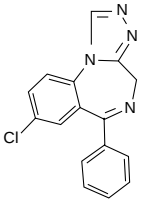
Methadone



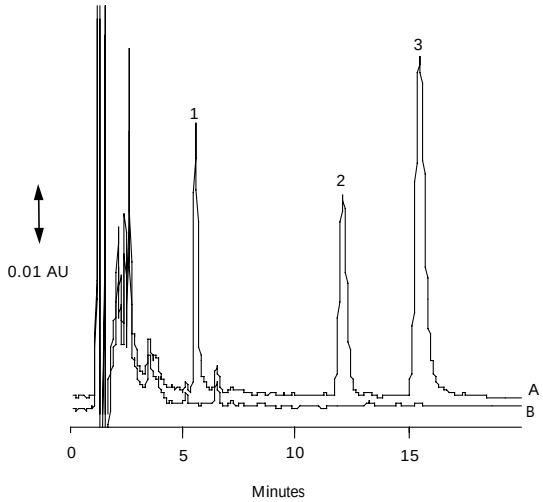
EDDP (Methadone Metabolite)



Estazolam



Chromatogram of Human Urine A) Blank, B) Spiked Sample



Oasis® MCX Extraction Method

Oasis® MCX Extraction Cartridge, 3 cc / 60 mg
Part Number WAT094226

No Conditioning

Load

3 mL acidified spiked human urine

Wash 1

2 mL 0.1M hydrochloric acid

Wash 2

2 mL methanol

Optional Wash 3

2 mL of 5% ammonium hydroxide
with 60% methanol

Elute

2 mL 5% ammonium hydroxide
with 95% methanol

Each elution diluted 1:1 with water for HPLC analysis

HPLC Method

Column: Symmetry® C_{18}, 5µm, 3.9 mm x 150 mm
Guard Column: Symmetry® C_{18}, 5µm, 3.9 mm x 20 mm
Mobile phase: 40% methanol, 60% 0.1% trifluoroacetic acid
Flow rate: 1 mL / min
Temperature: 30˚ C
Detection: UV @ 210 nm
Injection: 100 µL urine extract

Peaks

1. EDDP (0.2 µg / mL)
2. Estazolam (I.S.) (0.2 µg / mL)
3. Methadone (0.2 µg / mL)

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

LC-MS/MS Analysis of Methadone

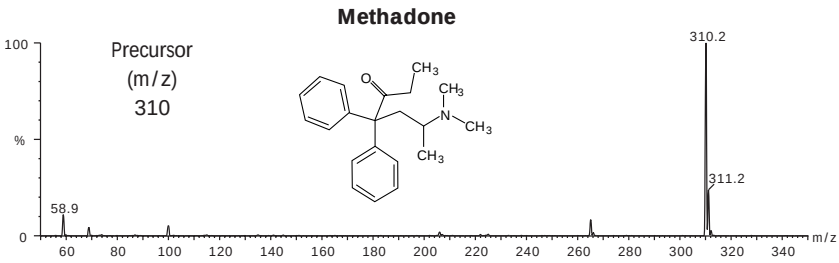


Figure 1: Background-subtracted electrospray mass spectrum of pure methadone standard (5ng), under optimum conditions. Chromatographed as described above to remove contaminants.

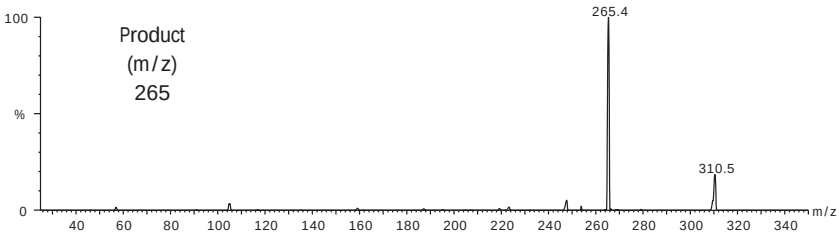


Figure 2: Background-subtracted electrospray product ion spectrum of pure methadone standard (5ng), under optimum conditions. Chromatographed as described above to remove contaminants.

Compound 1 name: Methadone
Coefficient of Determination: 0.997358
Calibration curve: 3091.54 * x + -50.8533
Response type: External Std, Area
Curve type: Linear, Origin: Exclude, Weighting: 1/x, Axis trans: None

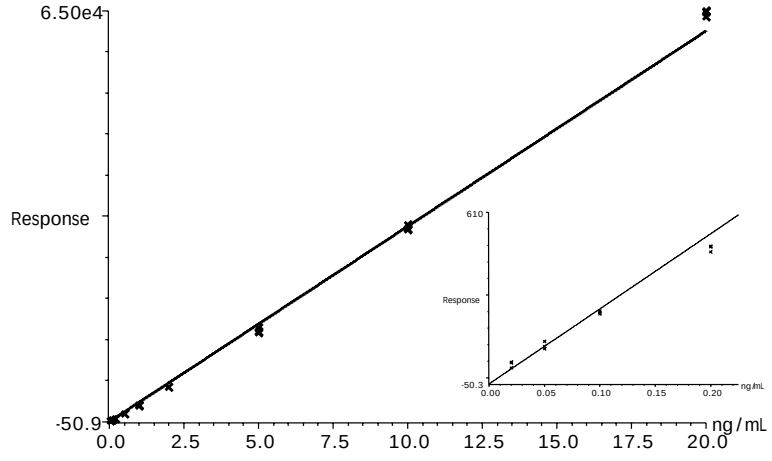


Figure 3: Calibration curve with triplicate injections for each point and demonstrating LOQ at 0.05ng/mL.

Oasis® MCX Extraction Method

Oasis® MCX Extraction Cartridge, 3 cc/60 mg
Part Number 186000254

No Conditioning

Load

3 mL acidified spiked human urine

Wash 1

2 mL 0.1M hydrochloric acid

Wash 2

2 mL methanol

Optional Wash 3

2 mL of 5% ammonium hydroxide with 60% methanol

Elute

2 mL 5% ammonium hydroxide with 95% methanol

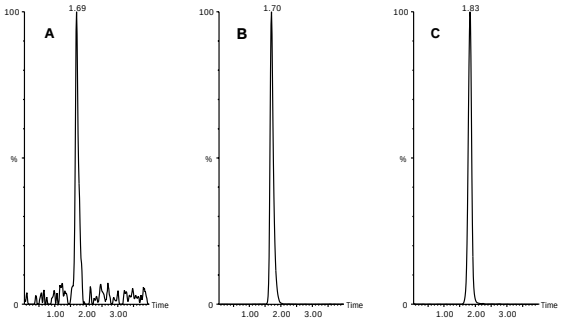


Figure 4: MRM Chromatograms under optimum conditions of pure methadone standard at (A) 0.05ng/mL (LOD) and (B) 5.0ng/mL and (c) a processed human plasma sample with a high concentration of methadone.

HPLC Method

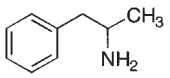
Column:	Symmetry® C_{18}, 3.5 µm, 2.1 mm x 100 mm
Flow:	200 µL/min
Mobile phase:	65% aqueous acetonitrile 2 mM ammonium acetate 0.1% formic acid
Injection:	10 µL
MS:	Micromass Quattro LC
Ion Mode:	ES+
Cone Voltage:	25 V
Collision Energy:	15 eV

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

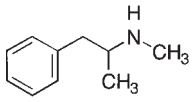
Amphetamine in Human Urine

Compound	%Recovery 0.7 µg/mL	(%RSD) 3.5 µg/mL
Amphetamine (n=8)	99.3 (4.9)	104.7 (1.8)
Methamphetamine (n=8)	105.5 (5.8)	100.9 (4.4)
Amphetamine Interday (n=16)		102.8 (2.7)
Amphetamine Interperson (n=16)	98.8 (6.2)	101.8 (3.3)
Methamphetamine Interday (n=16)		98.5 (5.4)
Methamphetamine Interperson (n=16)	96.4 (11.5)	99.4 (6.3)
Ephedrine (I.S.) (n=8)		89.5 (1.4)

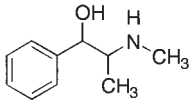
Amphetamine



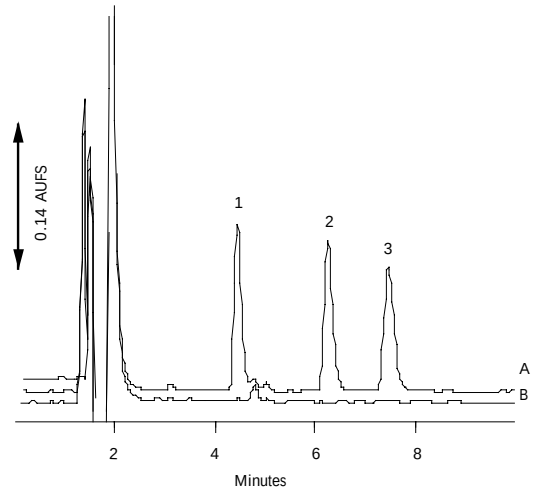
Methamphetamine



Ephedrine (I.S.)



Chromatogram of spiked Urine Extracts A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB Extraction Plate, 30 mg 96-well
Part Number WAT058951

Load

2 mL of acidified spiked human urine

Conditioning

1 mL methanol1 mL water

Wash 1

1 mL 5% methanol with
2% ammonium hydroxide

Wash 2

1 mL 20% methanol with
2% ammonium hydroxide

Elute

0.5 mL 20% methanol with 2% acetic acid

HPLC Method

Column:	SymmetryShield™ RP_{18}, 5 µm, 3.9 mm x 150 mm
Guard Column:	SymmetryShield™ RP_{18}, 5 µm, 3.9 mm x 20 mm
Mobile phase:	10% acetonitrile 90% 0.1% trifluoroactetic acid
Flow rate:	1 mL/min
Temperature:	30˚ C
Detection:	UV @ 214 nm (0.14 AUFS)
Injection:	50 µL

Peaks

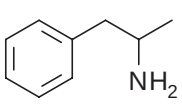
1. Ephedrine
2. Amphetamine
3. Methamphetamine

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

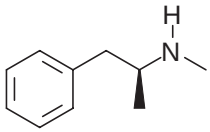
Amphetamine and Methamphetamine in Urine

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Amphetamine	500	110	1.84
Methamphetamine	500	107	2.19

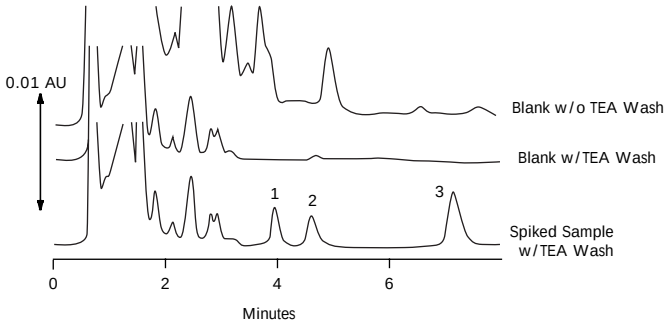
Amphetamine



Methamphetamine



Chromatogram of Urine Samples:



Oasis® MCX Extraction Method

Oasis® MCX Extraction Cartridge, Vac RC/60mg
Part Number 186000381

No condition/Equilibrate

Load

10 mL spiked urine (acidified with 100 µL 5 N HCl)

Wash 1

2 mL 5% methanol in 0.1 N HCl

Wash 2

2 mL 100% methanol

Wash 3

1 5 mL 2.5% TEA in methanol

Elute

2 mL 5% NH_4OH in methanol

HPLC Method

Column: SymmetryShield™ ,3 5 µm, $RP_{8,}$ 4.6 mm x 75 mm with Sentry Guard
Mobile phase: 5/95 methanol/20 mM K, 52:48 v/v
Injection volume: 10 µL
Temperature: 37˚ C
Flow rate: 2 mL/min
Detector: UV @ 214 nm

Peaks

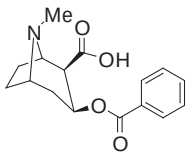
1. Amphetamine 500 ng/mL
2. Methamphetamine 500 ng/mL
3. Phentermine (I.S.)

Waters OASIS®
SAMPLE EXTRACTION PRODUCTS

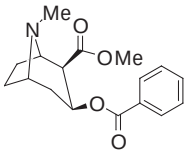
Drugs of Abuse: Cocaine and Its Metabolites

Compound	Concentration µg/mL	% Recovery	%RSD (n=6)
Benzoylecgonine	2.00	93.7%	1.7%
	0.40	93.6%	2.2%
Cocaine	2.00	98.0%	1.1%
	0.40	93.4%	2.9%
Cocaethylene	2.50	97.7%	2.8%
	0.50	98.2%	5.1%

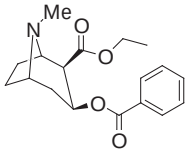
Benzoylecgonine



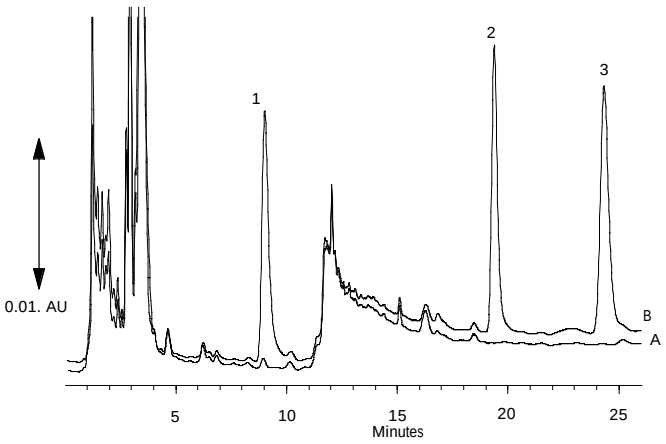
Cocaine



Cocaethylene



Chromatogram of Serum Extracts: A) Blank, B) Spiked Sample



Oasis® HLB Extraction Method

Oasis® HLB 1 cc/30mg Extraction Cartridge
Part Number WAT094225

Condition

1 mL methanol/1 mL water

Load

1 mL serum spiked porcine sample with 20 µL phosphoric acid

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconstitute

40˚ C under nitrogen stream 250 µL water methanol 80:20 (v/v)

HPLC Method

Column:	Symmetry® C_{18}, 5 µm, 3.9 mm x 150 mm with Sentry™ guard column, 3.9 mm x 20 mm
Sample:	1 mL of reconstituted porcine serum extract
Mobile phase:	A: 20 mM potassium phosphate, pH 7 B: Methanol
Gradient:	0–8.5 minutes,22% B; 8.5–8.6 minutes,58% B; 8.6–30.1 minutes, 58% B; 30. 1–45 minutes, 22% B
Flow rate:	1.0 mL/min
Detection:	UV at 235 nm
Peaks:	1: Benzoylecgonine 2: Cocaine 3: Cocaethylene

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LC-MS/MS Analysis of Cocaine

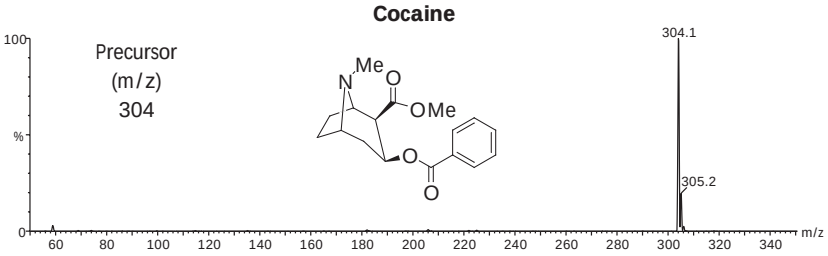

Figure 1: Background-subtracted electrospray mass spectrum of pure cocaine standard (5ng), under optimum conditions. Chromatographed as described above to remove contaminants.

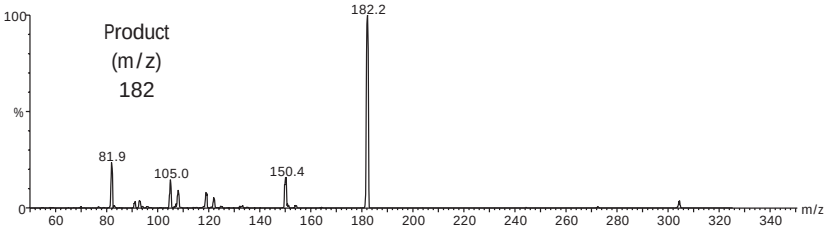

Figure 2: Background-subtracted electrospray product ion spectrum of pure cocaine standard (5ng), under optimum conditions. Chromatographed as described above to remove contaminants.

Compound 2 name: Cocaine
Coefficient of Determination: 0.997925
Calibration curve: 1449.66 * x + -9.92184
Response type: External Std, Area
Curve type: Linear, Origin: Exclude, Weighting: 1/x, Axis trans: None

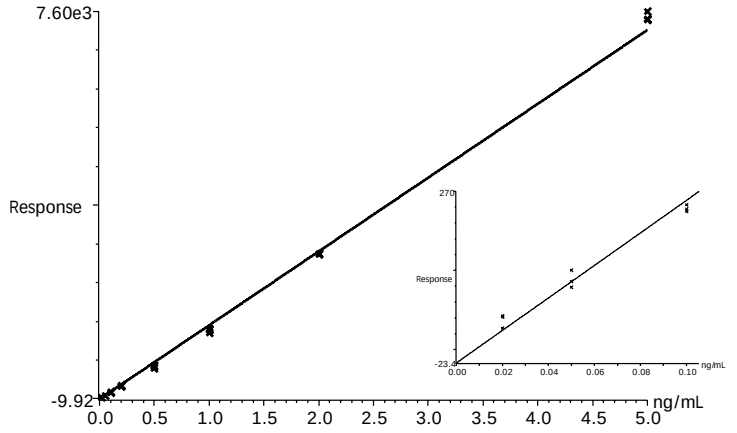

Figure 3: Calibration curve with triplicate injections for each point and demonstrating LOQ at 0.02ng/mL.

Oasis® HLB Extraction Method

Oasis® HLB 1 cc/30mg Extraction Cartridge
Part Number WAT04225

Condition

1 mL methanol/1 mL water

Load

1 mL spiked porcine serum sample with 20 µL phosphoric acid

Wash

1 mL 5% methanol in water

Elute

1 mL methanol

Evaporate and Reconstitute

40 °C under nitrogen stream, reconstitute mobile phase

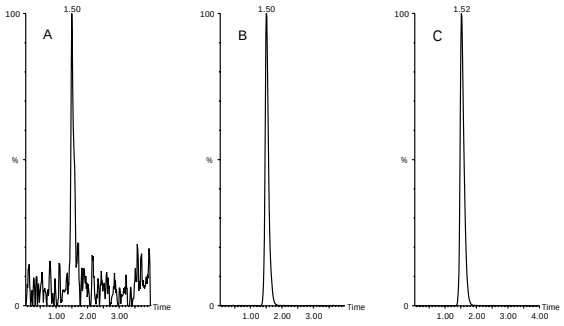

Figure 4: MRM Chromatograms under optimum conditions of pure cocaine standard at (A) 0.02ng/mL (LOD) and (B) 5.0ng/mL and (C) a processed human plasma sample with a high concentration of cocaine.

HPLC Method

Column:	Symmetry® C_{18}, 3.5 µm, 2.1 mm x 100 mm
Mobile phase:	65% aqueous acetonitrile 2 mM ammonium acetate 0.1% formic acid
Injection:	10 µL
MS:	Micromass Quattro LC
Ion Mode:	ES+
Cone Voltage:	35 V
Collision Energy:	18 eV

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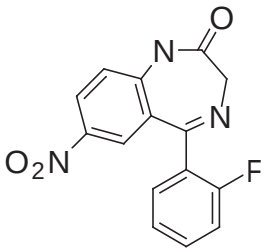
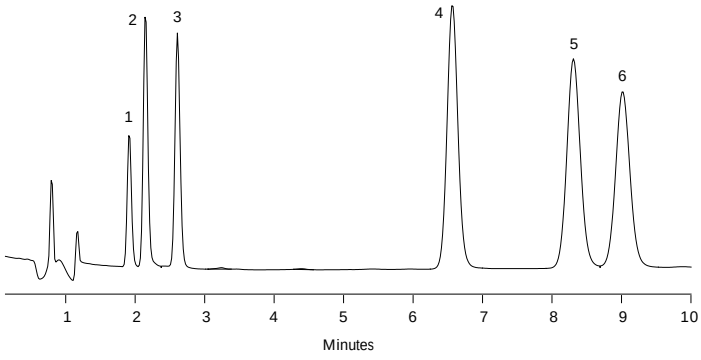
Flunitrazepam (Rohypnol™)

Compound	% Recovery
7-Amino Nitrazepam	118
7-Amino Clonazepam	100
7-Amino Flunitrazepam	95.9
Nitrazepam	93.7
Clonazepam	101
Flunitrazepam	85.9

Flunitrazepam





Oasis® HLB Extraction Method

Oasis® HLB Extraction Plate,30 mg 96-well
Part Number WAT058951

Condition

1 mL methanol

Equilibrate

1 mL water

Load

250 µL

Wash

1 mL, 10% methanol with acetic acid

Elute

1 mL, 40% methanol
with ammonium hydroxide

HPLC Method

Column: SymmetryShield™ RP_8, 5 µm, 3.9 mm x 150 mm
Mobile phase: 30% acetonitrile
Flow rate: 1.5 mL/min
Detector: UV at 220 nm
Temperature: Ambient
Injection volume: 100 µL

Peaks

1. 7-Amino Nitrazepam
2. 7-Amino Clonazepam
3. 7-Amino Flunitrazepam
4. Nitrazepam
5. Clonazepam
6. Flunitrazepam

Data supplied by J. Vukovik, L. Schofield
Waters Ltd., Canada

Oasis® Sample Extraction Products

Oasis® HLB Sample Extraction Products

Oasis® sample extraction products contain a polymeric, water-wettable sorbent that will allow you to process biologic samples faster and develop rugged methods to assay acidic, basic, and neutral drugs and their metabolites.

Description		Particle Size	Quantity	Part Number
Oasis® HLB cartridge	1 cc / 10 mg	30 µm	100 / box	186000383
Oasis® HLB cartridge	1 cc / 30 mg	30 µm	100 / box	WAT094225
Oasis® HLB cartridge with Gilson ASPC™ Adapter	1 cc / 30 mg	30 µm	500 / box	WAT058882
Oasis® HLB cartridge	3 cc / 60 mg	30 µm	100 / box	WAT094226
Oasis® HLB cartridge with Gilson ASPC™ Adapter	3 cc / 60 mg	30 µm	500 / box	WAT058883
Oasis® HLB cartridge	6 cc / 200 mg	30 µm	30 / box	WAT106202
Oasis® HLB cartridge	6 cc / 500 mg	60 µm	30 / box	186000115
Oasis® HLB cartridge	12 cc / 500 mg	60 µm	20 / box	186000116
Oasis® HLB cartridge	20 cc / 1 g	60 µm	20 / box	186000117
Oasis® HLB cartridge	35 cc / 6 g	60 µm	10 / box	186000118
Oasis® HLB Plus cartridge	225 mg	60 µm	50 / box	186000132
Oasis® HLB Vac RC cartridge	30 mg	30 µm	50 / box	186000382
Oasis® HLB Vac RC cartridge	60 mg	30 µm	50 / box	186000381
Oasis® HLB Glass cartridge	5 cc / 200 mg	60 µm	30 / box	186000683
Oasis® HLB Prospekt™ cartridge*	2 mm x 10 mm / 15 mg	30 µm	100 / box	186000258
* For use with Spark Holland Prospekt system				
Oasis® HLB column	1 mm x 50 mm	30 µm	1 / box	186000119
Oasis® HLB cartridge column	2.1 mm x 20 mm	25 µm	1 / box	186000706
Holder Kit for 2.1 mm x 20 mm cartridge column			1 / box	186000262
Oasis® HLB plate	5 mg / 96-well	30 µm	1 / pkg	186000309
Oasis® HLB plate	10 mg / 96-well	30 µm	1 / pkg	186000128
Oasis® HLB plate	30 mg / 96-well	30 µm	1 / pkg	WAT058951
Oasis® HLB plate	60 mg / 96-well	60 µm	1 / pkg	186000679

Oasis® MCX Sample Extraction Products

The Oasis® MCX (mixed-mode: cation-exchange, reversed-phase) sorbent enables the selective retention of basic drugs. It is designed to extract basic drugs from complex matrices such as whole blood, urine, serum, or plasma.

Description		Particle Size	Quantity	Part Number
Oasis® MCX cartridge	1 cc / 30 mg	30 µm	100 / box	186000252
Oasis® MCX cartridge	1 cc / 60 mg	60 µm	100 / box	186000782
Oasis® MCX cartridge	3 cc / 60 mg	30 µm	100 / box	186000254
Oasis® MCX cartridge	3 cc / 60 mg	60 µm	100 / box	186000253
Oasis® MCX cartridge	6 cc / 150 mg	30 µm	30 / box	186000256
Oasis® MCX cartridge	6 cc / 150 mg	60 µm	30 / box	186000255
Oasis® MCX cartridge	6 cc / 500 mg	60 µm	30 / box	186000776
Oasis® MCX cartridge	20 cc / 1 g	60 µm	20 / box	186000777
Oasis® MCX cartridge	35 cc / 6 g	60 µm	10 / box	186000778
Oasis® MCX Vac RC cartridge	60 mg	30 µm	50 / box	186000261
Oasis® MCX Vac RC cartridge	60 mg	60 µm	50 / box	186000380
Oasis® MCX plate	10 mg / 96-well	30 µm	1 / pkg	186000259
Oasis® MCX plate	30 mg / 96-well	30 µm	1 / pkg	186000248
Oasis® MCX plate	30 mg / 96-well	60 µm	1 / pkg	186000250
Oasis® MCX Plate	60 mg / 96-well	60 µm	1 / pkg	186000678

Oasis® Sample Extraction Products

Oasis® MAX Sample Extraction Products

Oasis® MAX (mixed-mode: anion-exchange, reversed-phase) sorbent gives you greater selectivity for your acidic drugs. It is designed to extract acidic drugs from complex matrices such as whole blood, urine, serum or plasma.

Description		Particle Size	Quantity	Part Number
Oasis® MAX cartridge	1 cc / 30 mg	30 µm	100 / box	186000366
Oasis® MAX cartridge	3 cc / 60 mg	30 µm	100 / box	186000367
Oasis® MAX cartridge	3 cc / 60 mg	60 µm	100 / box	186000368
Oasis® MAX cartridge	6 cc / 150 mg	30 µm	30 / box	186000369
Oasis® MAX cartridge	6 cc / 150 mg	60 µm	30 / box	186000370
Oasis® MAX cartridge	6 cc / 500 mg	60 µm	30 / box	186000865
Oasis® MAX Vac RC cartridge	30 mg	30 µm	50 / box	186000372
Oasis® MAX Vac RC cartridge	60 mg	30 µm	50 / box	186000371
Oasis® MAX Vac RC cartridge	60 mg	60 µm	50 / box	186000378
Oasis® MAX plate	10 mg / 96-well	30 µm	1 / pkg	186000375
Oasis® MAX plate	30 mg / 96-well	30 µm	1 / pkg	186000373
Oasis® Method Development Kit	3 cc / 60 mg	30 µm	10 each MCX, HLB, MAX	186000867

Manifold for Extraction Plate

Description	Quantity	Part Number
Extraction plate manifold	1 / box	WAT058941
Extraction Plate Manifold Kit A (includes extraction plate manifold, reservoir tray, manifold top gasket, sealing cap and 350 µL sample collection plate)		WAT097944
Extraction Plate Manifold Kit B (as kit A, with 1 mL sample collection plate)		WAT097945
Extraction Plate Manifold Kit C (as kit A, with 2 mL sample collection plate)		WAT097946

Accessories for Extraction Plate Manifold

Reservoir tray	25 / box	WAT058942
Sample collection plate, 350 µL	50 / box	WAT058943
Sample collection plate, 1 mL	50 / box	WAT058957
Sample collection plate, 2 mL	50 / box	WAT058958
Sealing cap for 96-well collection plate	50 sheets / pkg	WAT058959
Manifold gasket, top	1 / pkg	WAT058955
Manifold gasket, white	1 / pkg	WAT058956

Manifold for Extraction Cartridges

Description	Part Number
Waters extraction manifold, 20-position without rack (includes 20 needle tips, 25 plugs, and ejector tool)	WAT200677
Waters extraction manifold, 20-position (complete with rack for 13 mm x 75 mm tubes)	WAT200606
Waters extraction manifold, 20-position (complete with rack for 13 mm x 100 mm tubes)	WAT200607
Waters extraction manifold, 20-position (complete with rack for 16 mm x 75 mm tubes)	WAT200608
Waters extraction manifold, 20-position (complete with rack for 16 mm x 100 mm tubes)	WAT200609
Vacuum pump (110V, 60 Hz)	WAT085114
Vacuum pump (220V, 50 Hz)	WAT085115
Vacuum pump (110V, 50 Hz)	WAT085123

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Lit. Code: WT078

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