



OASIS<sup>®</sup> sample extraction PRODUCTS

If YOU can do it by SPE,  
OASIS<sup>®</sup>  
can do it BETTER.

## WATERS OASIS® FAMILY OF SAMPLE EXTRACTION PRODUCTS

The Oasis® family of solid-phase extraction products are designed to simplify and improve your sample preparation by combining the right sorbent chemistry, device format and methodology. Achieve robust, selective, and sensitive SPE methods without worrying about low recoveries caused by breakthrough of polar compounds, sorbent drying, pH limitations and undesirable silanol activity.

The Oasis® family of SPE products is unique for its purity, reproducibility, stability, and retention characteristics—covered by six U.S. patents.

Oasis® sorbents are the most widely used polymeric SPE products in Bioanalytical laboratories today.

Our ongoing goal for the past 10 years has been to provide innovative and flexible sample preparation tools for the separation scientist.

In 1996 we introduced the first water-wettable polymeric SPE sorbent, Oasis® HLB, designed for fast generic reversed-phase SPE. A year later we introduced advanced novel methodologies to enable cleaner more

selective extracts using Oasis® HLB. In 1999 we introduced two mixed-mode chemistries Oasis® MCX and MAX, enabling

highly selective and sensitive generic protocols for basic and acidic compounds.

We are committed to developing products that improve sample preparation performance. When it comes to device design and development, our goal of innovation and flexibility remains true. From our award winning Oasis® 96 well-plate design, our new on-line Oasis® SPE columns, to our latest innovation

the Oasis®  $\mu$ Elution plate which for the first time enables SPE of volumes as low as 25  $\mu$ L. The Oasis® family of SPE products provide not only improvement to SPE method performance but also simplify the method development process.

No matter what your sample prep challenges are, if you can do it by SPE, Oasis® can do it better!





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## WHY SPE?

Sample preparation is a key component of every analytical analysis (such as LC/MS/MS). By some estimates, 60-80% of the work activity and operating cost in the analytical laboratory is spent preparing samples for introduction into the system.

The importance of sample preparation, in particular SPE, stems from three major concerns—removing interferences from sample matrix, concentrating analyte(s) of interest, and improving analytical system performance.



*For high sensitivity analyses, such as those employing LC/MS/MS, proper sample preparation can be critical for minimizing matrix effects and concentrating analytes of interest. Oasis® Sample Extraction Products can be used with Waters LC/MS/MS Systems including this system that integrates the Waters® Quattro Premier™ Mass Spectrometer with the Waters® 1525µ Binary Pump and the 2777 Sample Manager using MassLynx™ 4.0 Software.*

### SPE OFFERS SOLUTIONS TO THESE MAJOR CONCERNS OF SAMPLE PREPARATION

#### REMOVING INTERFERENCES FROM SAMPLE MATRIX

Solid-phase extraction (SPE) has been proven to be an effective tool for selectively removing interferences, enabling sensitive, selective and robust LC/MS/MS analysis.

#### CONCENTRATING ANALYTE(S) OF INTEREST

Frequently, compounds of interest are present in levels too low for accurate and precise quantitation. SPE enables the enrichment of selected analytes without concentrating the interferences.

#### IMPROVING ANALYTICAL SYSTEM PERFORMANCE

Advances in SPE technology combined with robotic automation make SPE not only cost effective, but also a time efficient sample preparation technique, which improves analytical system performance by:

- *Introducing the analytes in a MS compatible solvent.*
- *Extending analytical column lifetime, reducing system downtime/maintenance.*
- *Minimizing ion suppression while improving signal response.*

Current Oasis® Patents:

Patent No. 5,882,521

Patent No. 6,254,780

Patent No. 5,976,376

Patent No. 6,322,695

Patent No. 6,106,721

Patent No. 6,468,422



Experiencing LOW RECOVERY?

IRREPRODUCIBLE results?

POLAR compound BREAKTHROUGH?

TRY OASIS®.

1  
chemistry

## WATERS INNOVATIONS IN SOLID-PHASE EXTRACTION

In 1996, Waters revolutionized SPE technology with the introduction of Oasis® HLB the first water-wettable polymeric sorbent, permanently changing the SPE marketplace. The Oasis® family includes three patented SPE chemistries for all your sample preparation needs:

- Oasis® HLB: Hydrophilic-Lipophilic Balance reversed-phase sorbent for all compounds.
- Oasis® MCX: Mixed-mode Cation-eXchange and reversed-phase sorbent for basic compounds.
- Oasis® MAX: Mixed-mode Anion-eXchange and reversed-phase sorbent for acidic compounds.

## OASIS® HLB CHEMISTRY

### UNIVERSAL SORBENT FOR ACIDIC, NEUTRAL AND BASIC COMPOUNDS

Oasis® HLB is a hydrophilic-lipophilic water-wettable reversed-phase sorbent for all your SPE needs. It is made from a balanced ratio of two monomers, the hydrophilic N-vinylpyrrolidone and the lipophilic divinylbenzene. It provides superior reversed-phase capacity with a special "polar-hook" for enhanced retention of polar analytes.

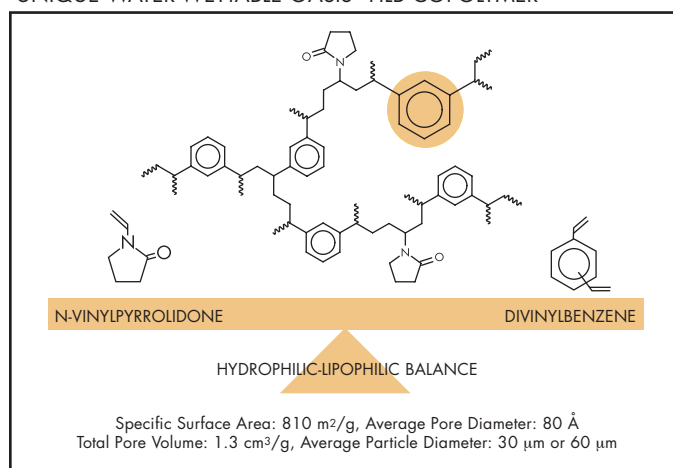
This unique chemistry has allowed Waters to build a family of SPE sorbents with special features like resistance to pH extremes, extraordinary retention of polar compounds and a 3X relative retention capacity vs traditional silica based SPE sorbents like C<sub>18</sub>.

There is no negative effect of drying on recovery with the water-wettable Oasis® sorbents. The excellent capacity for retention of a wider spectrum of analytes even when the sorbent runs dry means your SPE methods will be more rugged and robust; therefore requiring less repeat analysis.

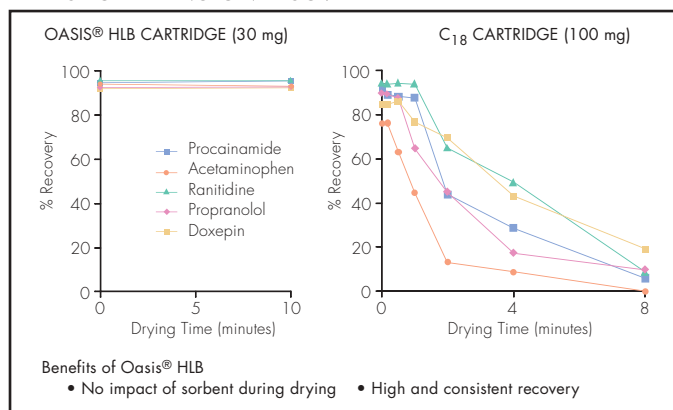
The advantage of having higher retention capacity (K') is that more analytes are retained with fewer breakthrough improving the overall reproducibility of the SPE method.

Available in five particle sizes (60 µm, 30 µm, 25 µm, 15 µm, and 5 µm) Oasis® HLB sorbent allows you to select the appropriate product based on the viscosity and turbidity of your sample in cartridge, plate, or column format.

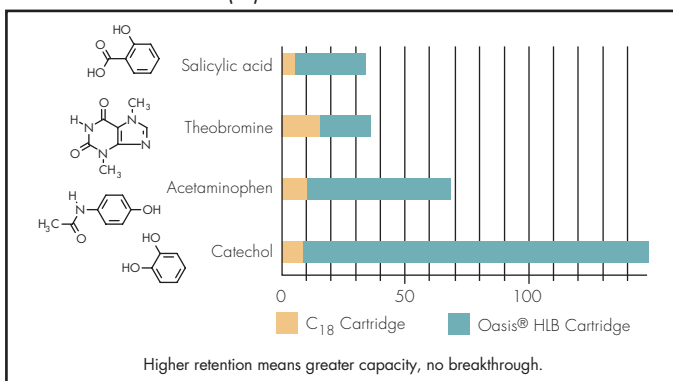
### UNIQUE WATER-WETTABLE OASIS® HLB COPOLYMER



### EFFECT OF DRYING ON RECOVERY



### RETENTION FACTOR (K') COMPARISON



## OASIS® MCX CHEMISTRY

### Mixed-mode Cation eXchange and reversed-phase sorbent

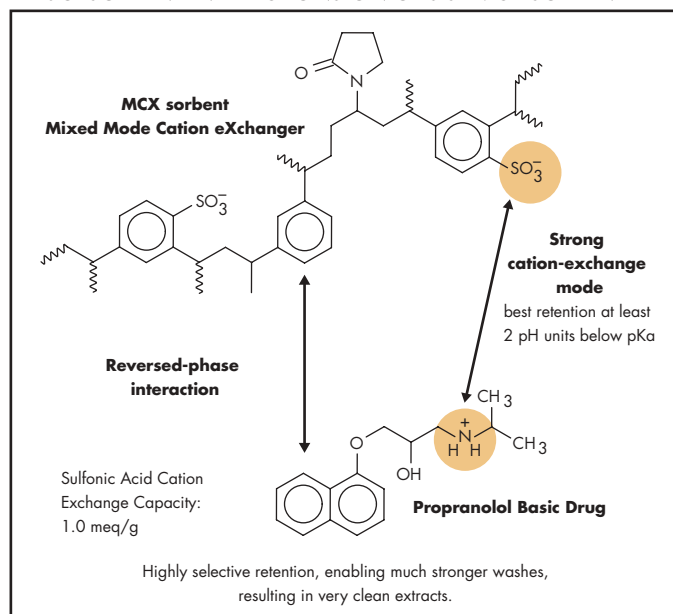
#### HIGH-SELECTIVITY AND SENSITIVITY FOR BASIC COMPOUNDS

Oasis® MCX is designed to overcome the limitations of traditional silica based mixed-mode SPE sorbents such as SCX and HCB. It is a strong cation-exchange, mixed mode water-wettable, polymeric sorbent produced by a Waters patented novel process for reproducibility. Oasis® MCX provides the dual modes of retention, ion exchange and reverse phase, on a single clean, stable, high surface area, organic co-polymer, and it is stable from pH 0 to 14.

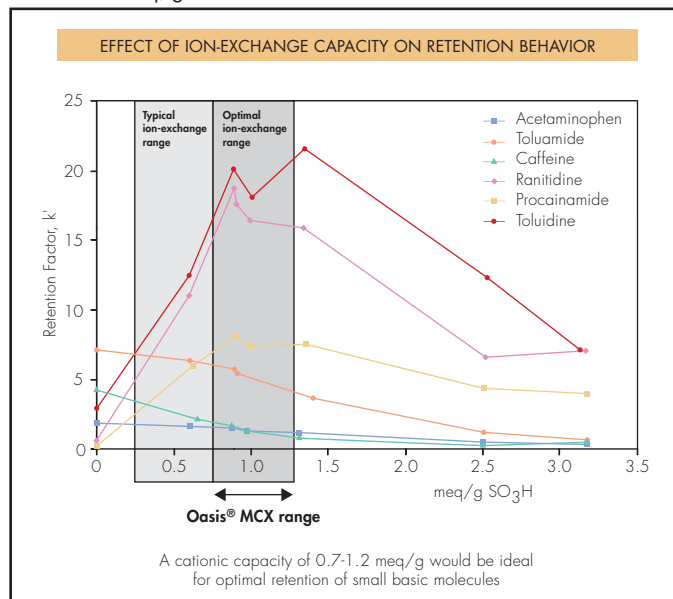
In addition to the pH stability common to polymers, Oasis® MCX has far greater binding capacity than other silica based mixed-mode SPE sorbents. The ability to fully manipulate pH (0-14) during the developments optimization and use of SPE methods on mixed-mode sorbents, enables not only fast straightforward method development but also helps to ensure very rugged and robust procedures. There is no analyte breakthrough and loss of recovery due to dissolution of silica particle at high pH and cleaving bonded phase at low pH.

Effective use of mixed-mode SPE sorbents for extraction of basic compounds from biological matrices (such as plasma, urine, bile, and tissue homogenates) requires high capacity, both reversed-phase for the retention of interference and ion-exchange for selective retention of analytes. Typical silica based mixed-mode sorbents are synthesized by a complex process, which is hard to control and, have relatively low ionic capacities ranging from 0.06-0.2 meq/g. The novel and well-controlled Waters process reproducibly delivers Oasis® MCX with 1.0 + meq/g of  $-SO_3H$  ion exchange capacity.

### DRUG-SORBENT INTERACTIONS ON OASIS® MCX SORBENT



### OASIS® MCX WHY 1.0 meq/g OF CATION-EXCHANGE CAPACITY?



## OASIS® MAX CHEMISTRY

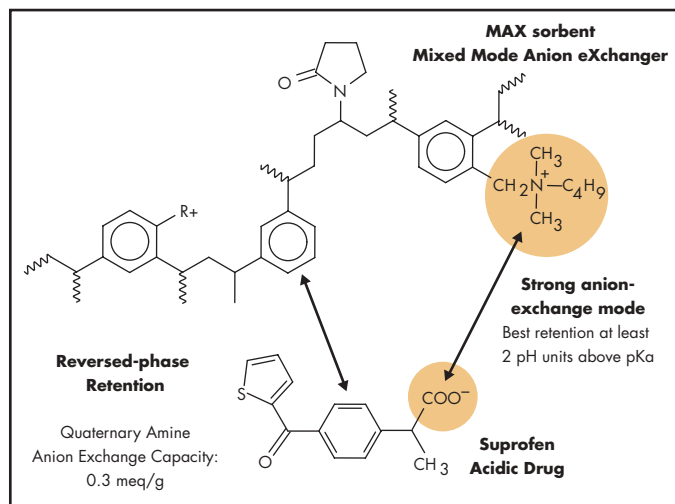
Mixed-mode Anion-eXchange and reversed-phase sorbent

### HIGH-SELECTIVITY AND SENSITIVITY FOR ACIDIC COMPOUNDS

Oasis® MAX is designed to overcome the limitations of traditional silica based mixed-mode SPE sorbents. It is a strong anion-exchange, mixed-mode water-wettable, polymeric sorbent stable from pH 0 to 14. Now you can employ reliable SPE to selectively detect, confirm or quantify acidic compounds and/or acidic metabolites in biofluids. SPE procedures using the selectivity and ruggedness of Oasis® MAX enable complex samples to be separated into two fractions, acidic compounds and basic/neutral compounds. Fractionation extracts can be analyzed by multiple analysis methods or even multiple techniques (LC/MS and GC/MS).

The novel and well-controlled Waters process reproducibly delivers Oasis® MAX with a primary amine having 0.3 meq/g of ion-exchange capacity. There are two available particle sizes (30 µm and 60 µm).

### DRUG-SORBENT INTERACTIONS ON OASIS® MAX SORBENT

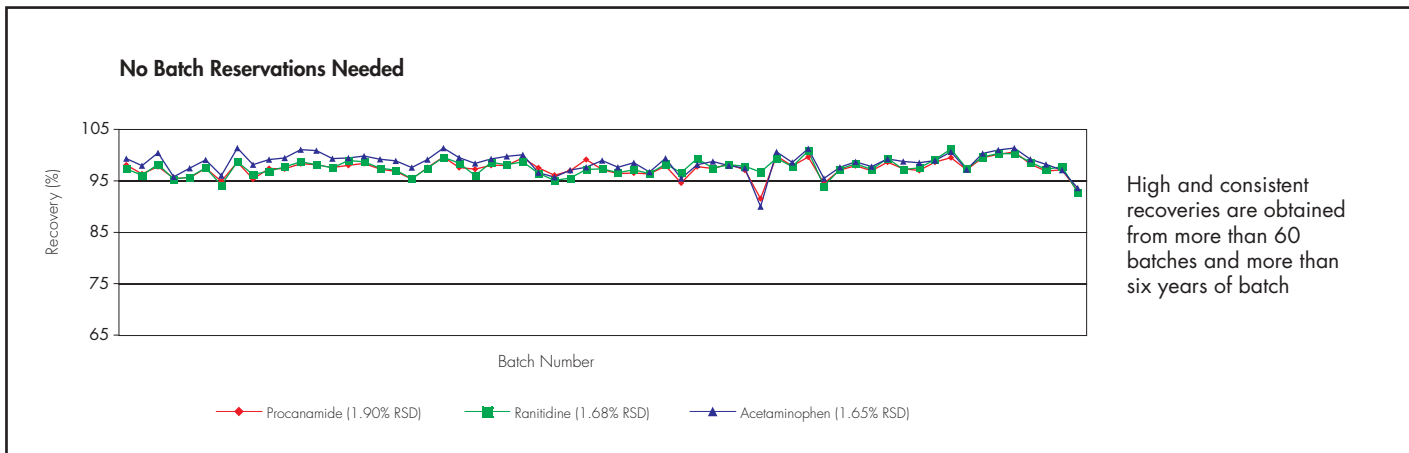


## EXCEPTIONAL BATCH-TO-BATCH REPRODUCIBILITY

Because of poor stability at pH extremes and relatively low ionic capacity traditional silica based mixed-mode sorbents don't have long-term batch-to-batch reproducibility and therefore require reservations of specific lots of sorbent for large projects. Oasis® sorbents have demonstrated excellent long-term batch-to-batch reproducibility for over 6 years. As a result of careful process design and stringent quality controls, a new standard has been set in batch-to-batch and lot-to-lot reproducibility for SPE sorbents. The Oasis® family of sorbents and devices are manufactured in a Waters ISO 9002 registered facility in compliance with cGMP guidelines of the U.S. Food and Drug Administration for class 1 medical devices.

Multiple batches of each Oasis® HLB, MCX and MAX have been successfully used on validated bioanalytical assays in a regulated laboratory environment.

### BATCH-TO-BATCH REPRODUCIBILITY OF OASIS® HLB SORBENT





Worried about SAMPLE VOLUME?  
Need LOW elution/HIGH concentration?  
Want FLEXIBILITY with 20 different formats?

TRY OASIS®.

2 format



## OASIS® SYRINGE BARREL CARTRIDGES

- Manufactured in an ISO 9002 facility in compliance with cGMP guidelines of the U.S. FDA for class 1 medical devices
- Ultra clean syringe barrel and frits
- Available in cartridges (ranging from 1 cc to 35 cc); Sep-Pak® Plus cartridges format; flangeless cartridges (1, 3, and 6 cc)

## OASIS® FAMILY OF SPE PRODUCTS



## OASIS® GLASS CARTRIDGES

- Ultra clean glass syringe with Teflon® frits
- Endocrine disruptors analysis at part-per-trillion levels
- Available in 5 cc (200 mg) configuration





## OASIS® μELUTION PLATES

- New and innovative μElution plate design
- Enabling technology facilitates elution volumes as little as 25 μL
- No evaporation and reconstitution necessary, just elute and shoot
- Ideal for small sample volumes
- Up to a 25x increase in concentration



## OASIS® ON-LINE COLUMNS

- Rugged, reproducible Ultrafast on-line analysis
- Compatible with all on-line analysis systems
- Wide choice of configurations, particle sizes, and sorbent chemistries
- Sensitivity of off-line SPE technique is achievable



## OASIS® PROSPEKT™ CARTRIDGES

- Available in Prospekt™ 1 and 2 for use with the Spark Holland Symbiosis™ systems
- Narrow-bore PVDF cartridge is 1 x 10 mm containing 2.5 mg of Oasis® sorbent
- High recovery and reproducible results for a wide range of compounds



## OASIS® 96-WELL EXTRACTION PLATES

- Patented two-stage well design (1999 R&D 100 Award winner)
- High throughput and high recovery
- Available in 5 mg, 10 mg, 30 mg, and 60 mg per well
- Compatible with most liquid handling robotic systems for automated reliable HT-SPE

## THE OASIS® μELUTION PLATES

### WATERS LATEST INNOVATION IN SPE TECHNOLOGY

- Elute in as little as 25 μL with no evaporation/reconstitution
- Ideal for small sample volumes
- Up to a 25x increase in sensitivity

The new Oasis® μElution plates combine patented plate design, proven Oasis® chemistries, and detailed protocols enabling elution volumes as low as 25 μL. Now, for the first time, you can perform SPE clean-up and analyte enrichment on very small sample volumes.



### OASIS® μELUTION TECHNOLOGY VS. DISK TECHNOLOGY

There are two predominant low elution SPE technologies in the market place today, SPE Disk and Oasis® μElution. These technologies differ greatly in performance primarily because of three features: Aspect Ratio, Hold-up Volume, and Elution Volume

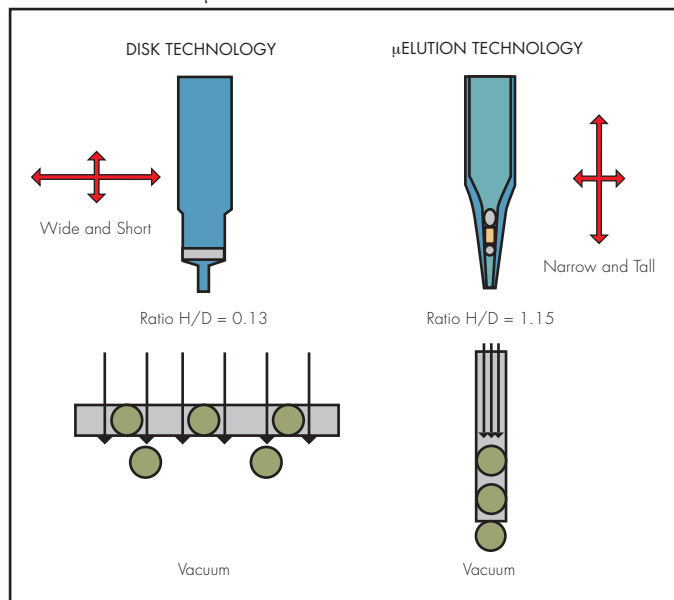
There is a correlation between the Aspect Ratios (H/D) and performance of SPE devices. A H/D ratio less than 1.0 is considered undesirable with respect to performance. In SPE disk design, (e.g. membrane/glass-fiber disk) a small mass of sorbent is embedded into a thin support structure having good flow properties, but a small aspect ratio H/D=0.3. In contrast, the Oasis® μElution technology uses an internally tapered well packed with high capacity Oasis® sorbent having an aspect ratio H/D=1.15, nearly 3X the disk technology. The μElution technology functions more like a chromatography column, minimizing loss of analyte during critical steps in the SPE procedure, enhancing the overall extraction efficiency.

A small hold-up volume is important for achieving minimal elution volume. SPE disk plates have hold-up volumes in the 35-65 μL range, as compared to the Oasis® μElution which was determined to be as little as 15 μL. Having 2-4X less hold up volume helps achieve a minimal elution volume as well as reduces the loss of analyte during elution, which improves recovery and precision.

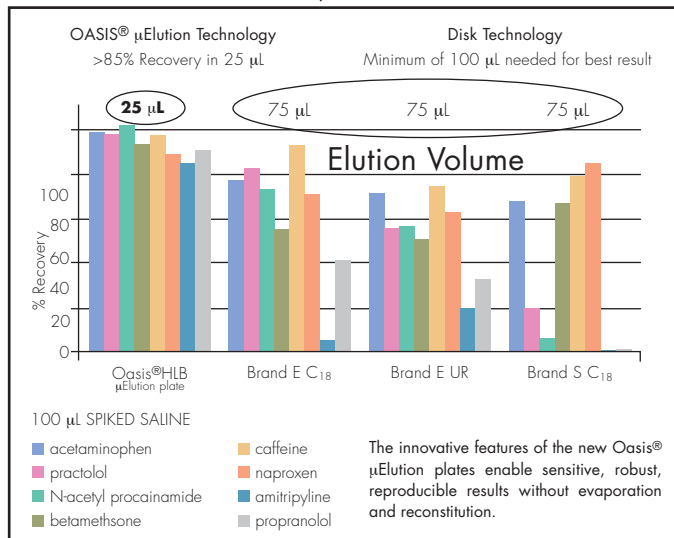
Minimizing SPE elution volume is critical for SPE performance, recovery and precision. The Oasis® μElution plate technology has minimum elution volumes in the range of 25-50 μL; compared to the typical elution volumes for SPE disk technology ranging from 75-300 μL.

The ability to reproducibly elute in 25 μL provides advantages in overall SPE performance enabling removal of the time consuming evaporation step, allowing SPE to be performed on very small sample volumes and increasing sample enrichment as much as 5 fold. The innovative features of the Oasis® μElution plates enable sensitive, robust, reproducible results without evaporation and reconstitution producing superior analytical performance in terms of sensitivity, selectivity and ruggedness.

### COMPARISON OF μELUTION VS. DISK TECHNOLOGY



### RECOVERY COMPARISON OF μELUTION VS. DISK TECHNOLOGY



## OASIS® ON-LINE COLUMNS

### ULTRA FAST ON-LINE SPE FOR LC/MS/MS

Ultra fast on-line analysis can improve the speed and throughput of LC/MS analysis of small molecules from biologic sample matrices. There are three Oasis® On-Line column configurations designed to fit all your on-line analyses needs.

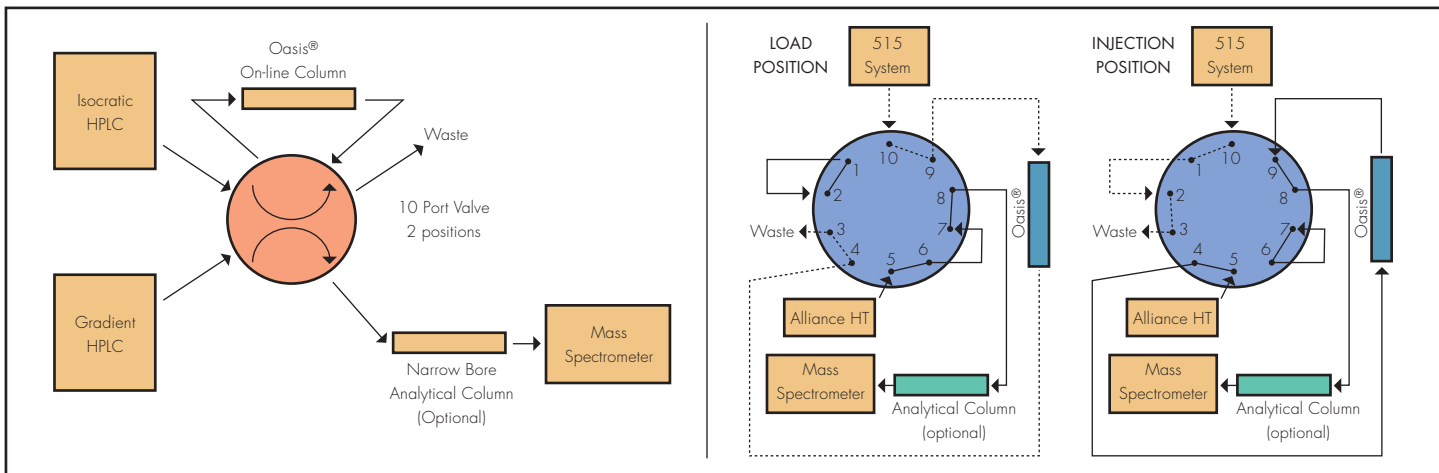
- The Oasis® cartridge column fits into a Sentry™ holder that features a finger-tighten fitting for fast and convenient replacement (1).
- The direct connect column can be screwed directly into a switching valve or connected to fittings like a conventional HPLC column (2).
- The Oasis® column features traditional HPLC column fittings and hardware (3).



All of these formats are available with the three Oasis® patented sorbents (HLB, MCX, and MAX), and in a wide choice of particle sizes as well as dimensions. The Oasis® On-Line columns make it possible to analyze a specific analyte or metabolite from a complex sample matrix (such as plasma or serum). No off-line sample preparation is needed; just dilute the sample and inject.

Ultra fast on-line analysis of multiple analytes can also be accomplished using the Oasis® On-Line column combined with Waters narrow-bore analytical columns (such as Atlantis™, XTerra®, or Symmetry® columns).

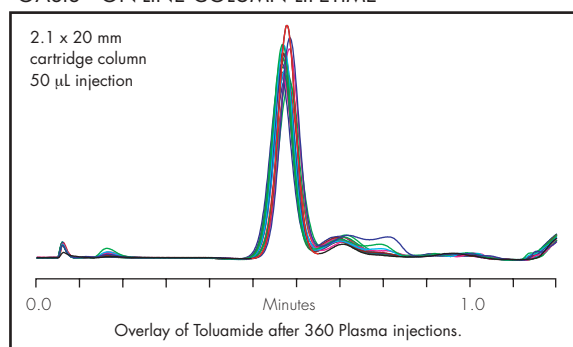
### ULTRA FAST ON-LINE SYSTEM CONFIGURATION



Up to 360 injections were achieved on a single Oasis® HLB 2.1 mm x 20 mm cartridge column without any visible deterioration of the peak shape.

Centrifugation, dilution and/or acidification of the sample prior to analysis may actually provide even longer column lifetimes.

### OASIS® ON-LINE COLUMN LIFETIME



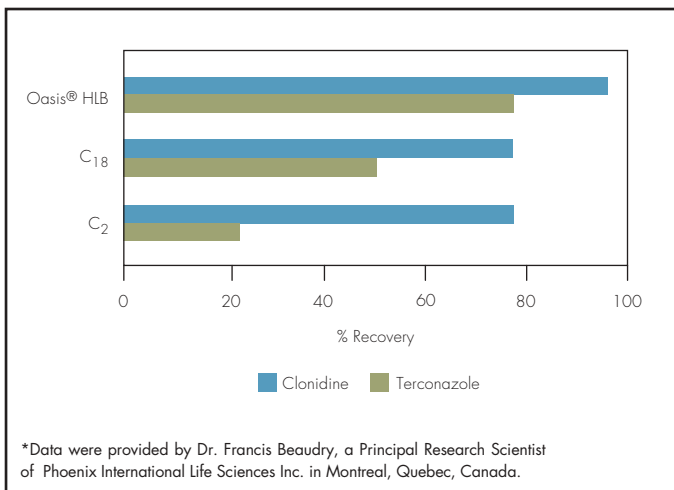
## OASIS® PROSPEKT™ CARTRIDGES

### ON-LINE SPE WITH OASIS® SORBENT IN PROSPEKT™ CARTRIDGES

Waters Oasis® sorbents are available in Prospekt™ 1 and Prospekt™ 2 cartridges for use with the Spark Holland Prospekt™/Symbiosis™ systems. The narrow-bore PVDF cartridge is 1.0 mm x 10 mm contain approximately 2.5 mg of Oasis® sorbent.

The Oasis® sorbents in Prospekt™ cartridges show the same performance advantage for pharmaceutical compounds over silica-based sorbents.

### RECOVERY COMPARISON OF OASIS® HLB VS. BONDED SILICA PROSPEKT™ CARTRIDGE

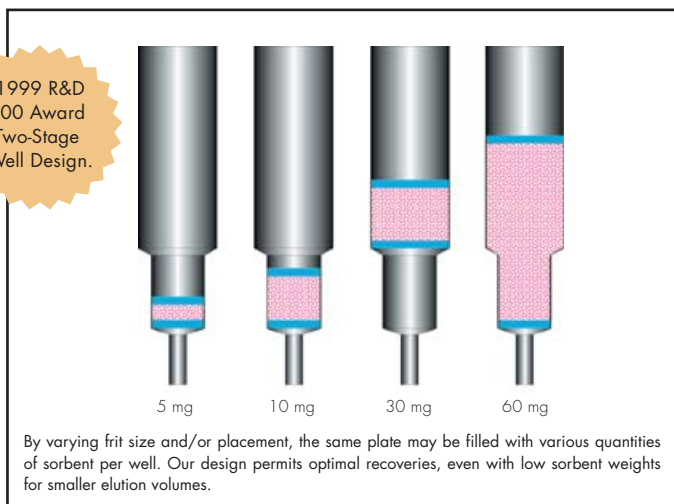


## OASIS® 96-WELL PLATES

### VERSATILE HIGH THROUGHPUT OASIS® 96-WELL EXTRACTION PLATES

Waters award-winning plate design, with three chemistry and four mass options provides flexible high-throughput options for your SPE needs in a single device. The Oasis® 96-well plates are designed to be used on many manifold configurations and most robotic liquid handling systems. Oasis® sorbents' unique water-wettability means you will never have to worry about poor results from individual wells of the 96-well plate drying out. As always you can expect Oasis® SPE products to perform reliably, delivering high and reproducible recoveries for a wide range of analytes including polar and basic compounds, with RSDs less than 5% (n=96).

### WATERS 96-WELL PLATE DESIGN





Having problems with METHODS DEVELOPMENT?

Need SIMPLE,  
REPRODUCIBLE methods?

Want STRAIGHTFORWARD method  
development STRATEGY?

TRY OASIS®.

3 methodology

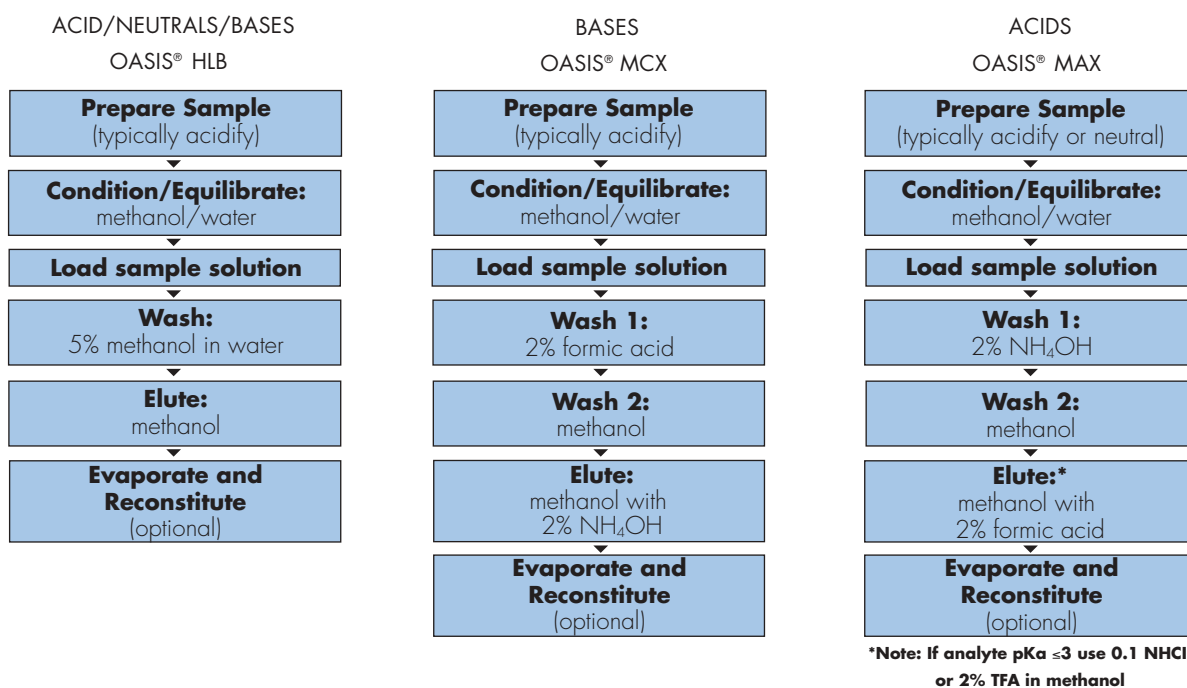
## METHODOLOGY

The Waters team of application chemists have developed a straightforward method development strategy based on our 25 years of SPE experience and the unique features of our patented Oasis® SPE products. We describe this strategy in four steps, starting with a generic protocol and predictable manipulation of organic concentration and pH to increase selectivity for the compound(s) of interest.

- Section 1: Oasis® Generic Methodology
- Section 2: Oasis® Reversed-Phase (HLB) Optimized Methodology
- Section 3: Oasis® Mixed-Mode (MCX/MAX) Optimized Methodology
- Section 4: Oasis® Advanced Methodology

## SECTION 1: OASIS® GENERIC METHODOLOGY

When working with a wide range of acidic, basic, and neutral compounds, the Oasis® HLB generic method is recommended. The goal is to remove unretained matrix (i.e. salts, lipids, proteins) from sample allowing reproducible extraction of the acid, basic, and neutral compound of interest. For basic compounds, the Oasis® mixed-mode MCX generic method is recommended. The goal is to first remove unretained matrix in the reversed-phase mode, then remove retained non-basic interference in the ion-exchange mode. The same mixed-mode approach for acidic compounds is recommended with the Oasis® MAX generic method. When transferring methods from a C<sub>18</sub>-bonded phase to Oasis® products, keep in mind the greater capacity of the Oasis® HLB sorbent. The Oasis® sorbent has 2-3x more surface area and shows a dramatic increase in k' values compared to silica-based C<sub>18</sub>.



### RECOMMENDED VOLUME FOR GENERIC METHODS

Size/ sorbent mass	Cartridges			96-Well Plate				μElution Plate
	1 cc	3 cc	6 cc	5 mg	10 mg	30 mg	60 mg	2 mg
Condition/ Equilibration	1 mL	2 mL	3 mL	200 μL	500 μL	500 μL-1 mL	500 μL-2 mL	200 μL
Load*	1 mL	2 mL	5 mL	1 mL	1-2 mL	1-2 mL	1-2 mL	Up to 750 μL
Wash	1 mL	2 mL	4 mL	200 μL	500 μL	0.5-1 mL	1-2 mL	200 μL
Elute	1 mL	2 mL	4 mL	50-200 μL	150-300 μL	400 μL-1 mL	0.8-2 mL	25-100 μL

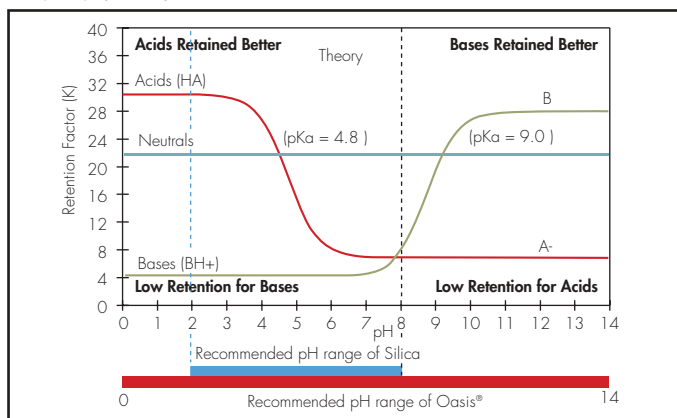
\* Note: above listed sample volumes are for biological samples; for certain types of samples (i.e. drinking water) up to 20 times of sample solution is possible.

## SECTION 2: OASIS® REVERSED-PHASE (HLB) OPTIMIZED METHODOLOGY

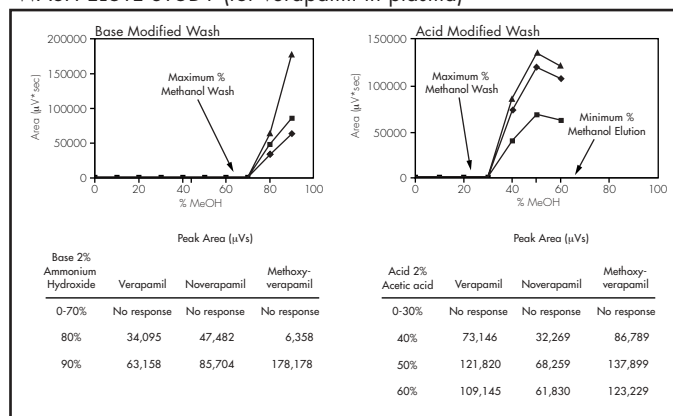
This optimized method is designed to produce cleaner extracts than those produced by generic methods.

This optimization process uses fundamental chromatographic principles to control the retention of both interferences and analytes on the Oasis® HLB sorbent. We systematically vary pH and organic concentration called a 2-Dimensional Wash-Elute study to determine the optimal retention and elution parameters for both analytes of interest and interferences. To demonstrate the process, we use verapamil and two of its metabolites.

### RETENTION FACTOR VERSUS pH FOR ACIDS, BASES, AND NEUTRALS

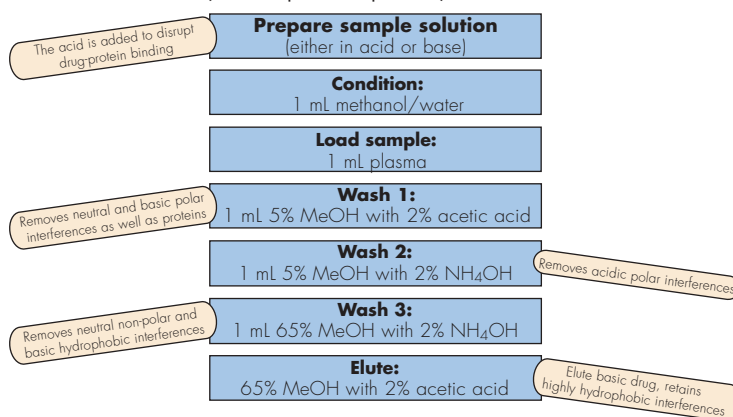


### WASH ELUTE STUDY (for verapamil in plasma)

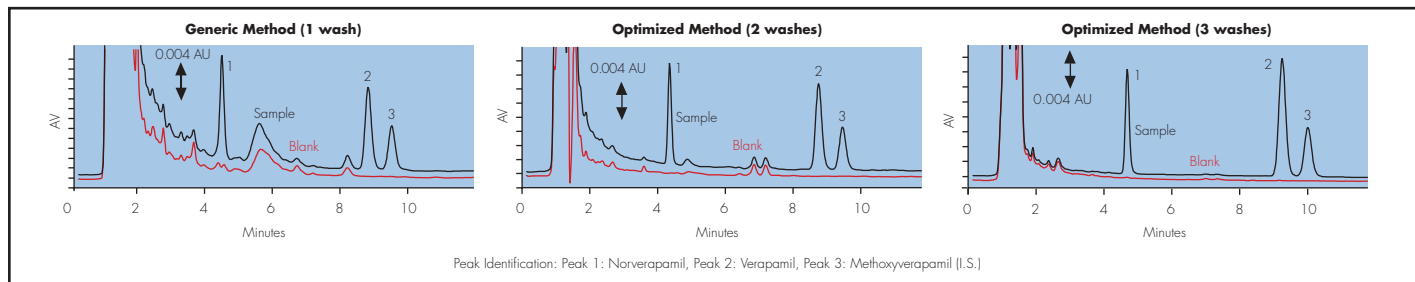


The 2-Dimensional Wash-Elute data is used to construct the optimized Oasis® HLB SPE method for verapamil, including load, wash and elution steps. Optimizing each step has an impact on the chromatography. The selectivity of the extraction can be improved thereby improving the sensitivity of the analysis.

### OPTIMIZED OASIS® HLB METHOD (for verapamil in plasma)



### EFFECTS OF OPTIMIZED METHOD ON CHROMATOGRAPHY



The Oasis® reversed-phase (HLB) optimized methodology is made rugged and reproducible because of some of the unique properties of the patented Oasis® HLB polymer, which provides excellent pH stability across the entire pH range (0 to 14) allowing SPE methods development at pH extremes. The Oasis® HLB polymer also exhibits three-to-five times higher retentivity/capacity than C<sub>18</sub>. This higher capacity facilitates fast and reproducible method development.

## SECTION 3: OASIS® MIXED-MODE (MCX/MAX) OPTIMIZED METHODOLOGY

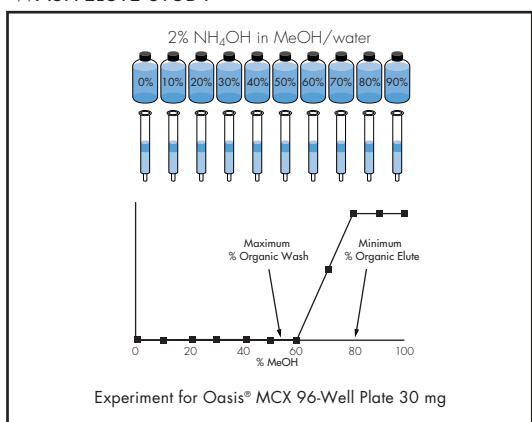
The mixed-mode optimized method is designed to produce cleaner extracts than those produced by reversed-phase SPE methods. Mixed-mode SPE utilizes dual modes of retention (reversed-phase and ion-exchange) to selectively isolate basic (or acidic) compounds and interferences providing increased sensitivity. The Oasis® mixed-mode (MCX/MAX) optimized methodology uses fundamental chromatographic principles to control the retention of both analytes and interferences on the Oasis® mixed-mode sorbents. We systematically vary pH and organic concentration to reproducibly manipulate the ionization state of the ion exchanger portion of the sorbent as well as the ionization state of the compounds and interference to facilitate retention or elution by ion exchange while also manipulating reversed-phase retention with organic concentration.

### OASIS® MIXED-MODE MCX OPTIMIZED METHODOLOGY

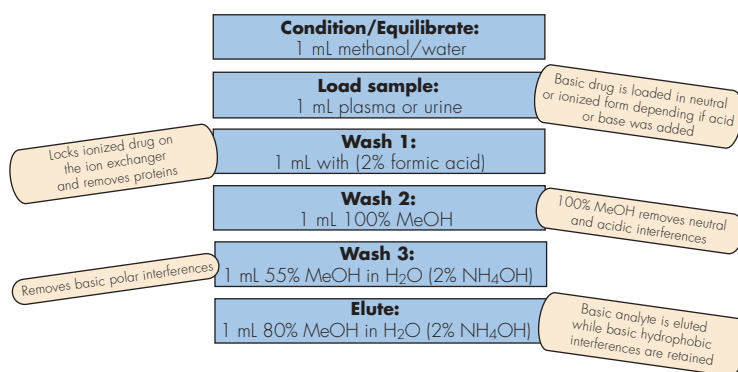
To obtain the greatest selectivity and sensitivity for basic compounds, optimization of the generic mixed-mode MCX method is recommended. To do so, a 2-Dimensional Wash-Elute study is performed to determine the optimal retention and elution parameters for both analytes of interest and interferences on the Oasis® MCX sorbent.

The 2-Dimensional Wash-Elute data is used to construct the optimized Oasis® MCX SPE method for basic compounds. This optimized method will selectively remove non-polar neutral, acidic, and polar basic interferences producing a very clean extract, which enables much greater sensitivity.

#### WASH-ELUTE STUDY

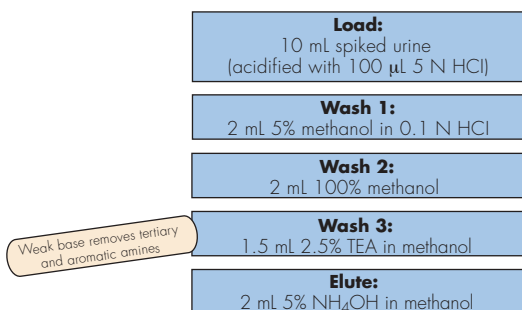


#### OPTIMIZED OASIS® MCX METHOD

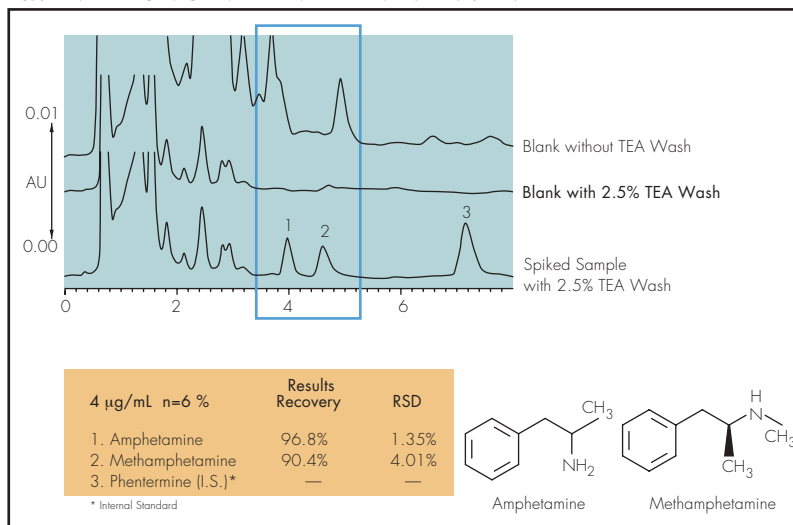


An example of the Oasis® mixed-mode MCX optimized methodology demonstrates how the wash-elute study is performed to optimize the elution parameters for the concentration of TEA. This data is then used to construct an optimize method with great selectivity for Primary amines. This selectivity enables, in this case the quantitation of methamphetamine from urine.

#### OASIS® MCX URINE APPLICATION: AMPHETAMINE AND METHAMPHETAMINE



#### OPTIMIZED OASIS® MCX METHOD: QUANTITATION OF METHAMPHETAMINE IN URINE

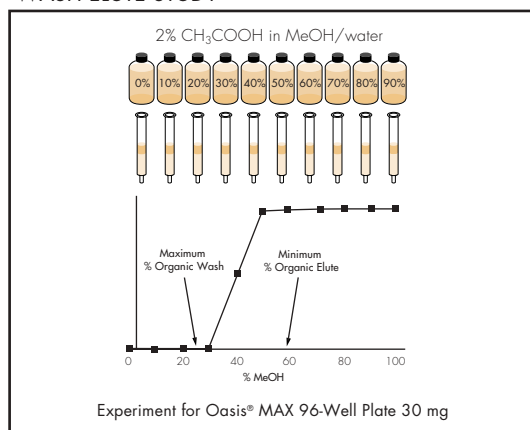


## OASIS® MIXED-MODE MAX OPTIMIZED METHODOLOGY

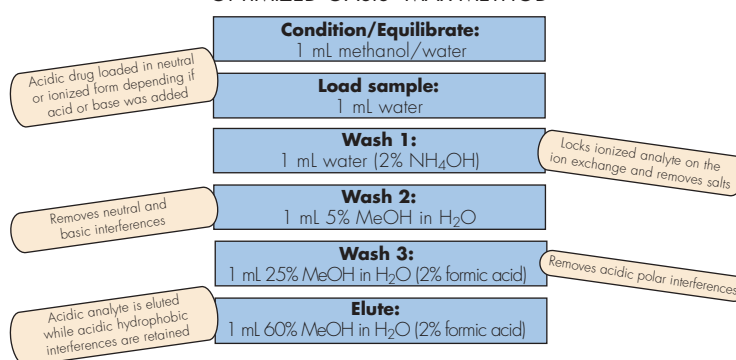
To obtain the greatest selectivity and sensitivity for acidic compounds, optimization of the generic mixed-mode MAX method is recommended. To do so, a 2-Dimensional Wash-Elute study is performed to determine the optimal retention and elution parameters for both analytes of interest and interferences on the Oasis® MAX sorbent.

The 2-Dimensional Wash-Elute data is used to construct the optimized Oasis® MAX SPE method for acidic compounds. This optimized method will selectively remove non-polar neutral basic and polar acidic interferences producing a very clean extract, which enables much greater sensitivity.

### WASH ELUTE STUDY



### OPTIMIZED OASIS® MAX METHOD



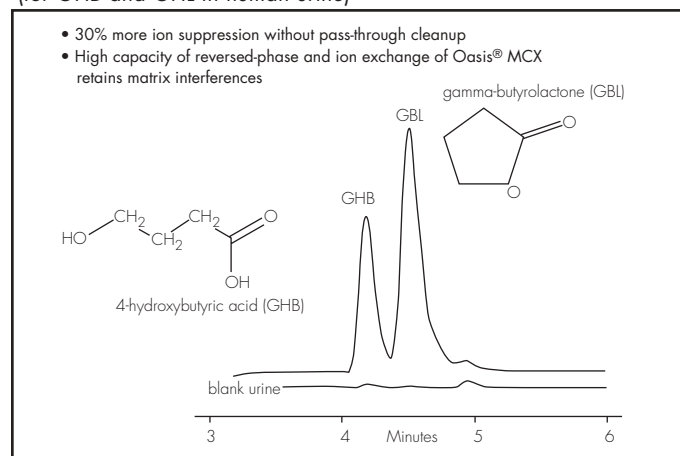
## SECTION 4: OASIS® ADVANCED METHODOLOGY

The unique properties of the patented Oasis® chemistries and the array of device formats allow straightforward and simple method development strategies for traditional SPE applications. The Oasis® product family also allows the flexibility to creatively solve sample preparation challenges, historically not possible or performed efficiently by SPE.

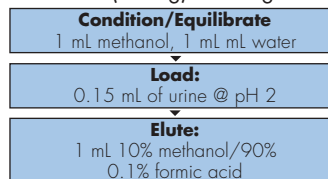
### OASIS® PASS-THROUGH METHOD

Extremely polar analytes are poorly retained by reversed-phase and therefore very difficult to extract by SPE. Using the high capacity, both ion exchange and reversed-phase, of the Oasis® MCX we solve the problem of extracting extreme polar compounds like 4-hydroxybutyric acid (GHB) and its metabolite gamma-butyrolactone (GBL) from complex matrices like human urine. The Oasis® MCX retains polar analytes and interferences by dual retention modes and allows salt and lipids to pass through. The low organic mobile phase is used to reproducibly elute the polar analytes leaving all other interferences retained.

### PASS-THROUGH OASIS® MCX RESULTS (for GHB and GBL in human urine)

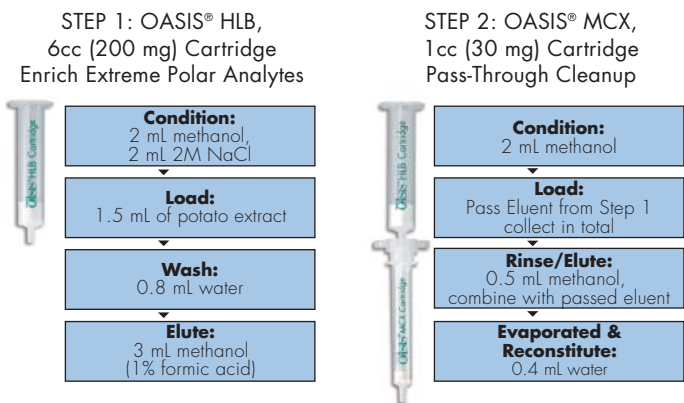


### OASIS® MCX, 3cc (60 mg) Cartridge

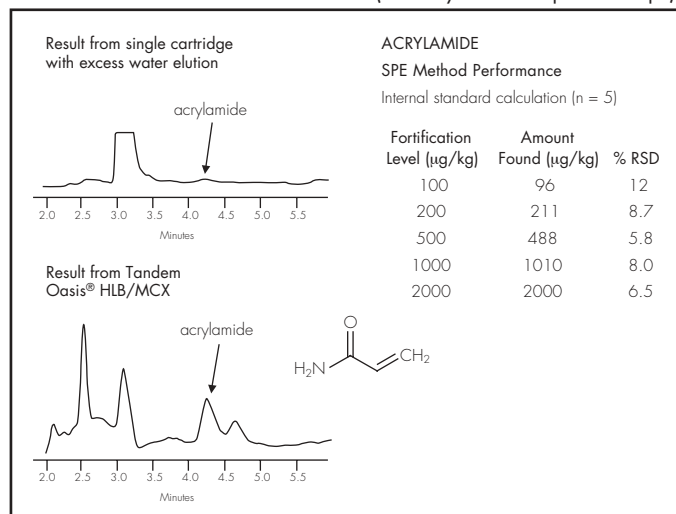


### TANDEM OASIS® HLB-MCX METHOD

Extremely polar analytes are poorly retained by reversed-phase and therefore very difficult to extract by SPE. Using the high capacity, both ion-exchange and reversed-phase, in a tandem cartridge format Oasis® sorbents provide a novel solution to the problem of extracting extreme polar compounds like acrylamide from potato chip samples. Demonstration follows: Step 1: use Oasis® HLB to extract and enrich low levels of acrylamide for potato chips; Step 2: use Oasis® MCX in tandem with Oasis® HLB to optimize clean-up and recovery of acrylamide.



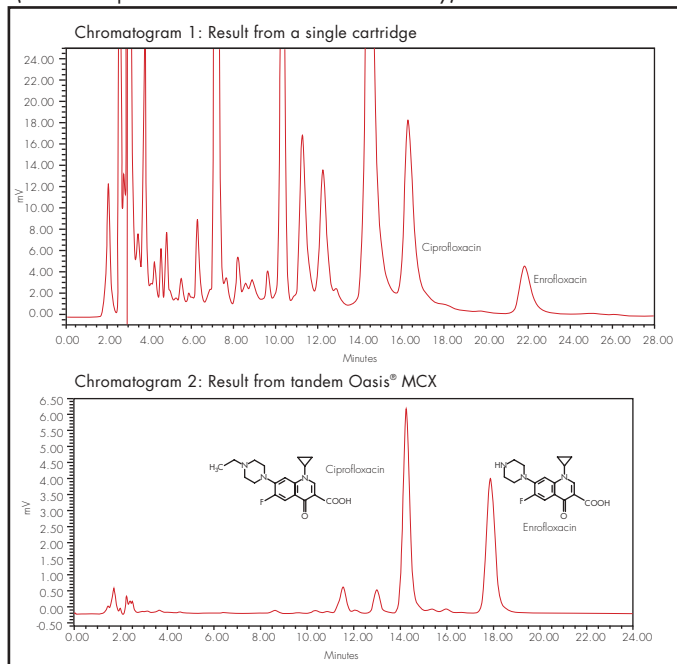
### TANDEM OASIS® HLB-MCX RESULTS (for acrylamide in potato chips)



### TANDEM OASIS® HLB-MAX METHOD

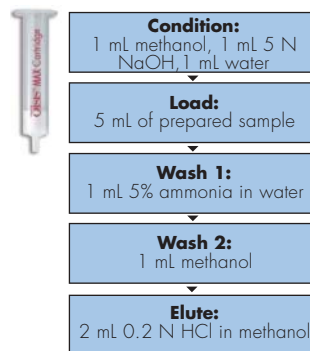
Reproducibly extracting small molecules (such as fluoroquinolones, amphoteric analytes) from very complex matrices (such as tissue homogenates) by SPE has traditionally been challenging because of the competition for the sorbent capacity between matrices and analytes. Using the Oasis® MAX (Step 1), we selectively retain amphoteric analytes and remove excess matrices including basic and neutral interferences. We are then able to use Oasis® MCX (Step 2) to selectively extract the amphoteric analytes and remove acidic interferences.

### TANDEM OASIS® MAX-MCX RESULTS (for fluoroquinolone antibiotics in beef kidney)



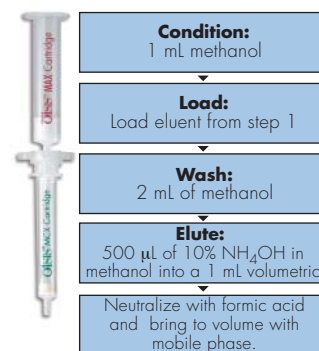
### STEP 1: OASIS® MAX, 6cc (150 mg) Cartridge

Removes Basic and Neutral Interferences



### STEP 2: OASIS® MCX, 1cc (30 mg) Cartridge

Removes Acidic Interferences



## OASIS® HLB SAMPLE EXTRACTION PRODUCTS

Description		Particle Size	Quantity	Part No.
Oasis® HLB cartridge	1 cc/10 mg	30 µm	100/box	186000383
Oasis® HLB cartridge	1 cc/30 mg	30 µm	100/box	WAT094225
<b>NEW</b> Oasis® HLB Flangeless cartridge	1 cc/30 mg	30 µm	100/box	186001879
Oasis® HLB cartridge with Gilson ASPC™ Adapter	1 cc/10 mg	30 µm	500/box	186000988
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
<b>NEW</b> Oasis® HLB Flangeless cartridge	3 cc/60 mg	30 µm	100/box	186001880
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	20 cc/30 mg	30 µm	50/box	186000382
Oasis® HLB Vac RC cartridge	20 cc/60 mg	30 µm	50/box	186000381
Oasis® HLB Glass cartridge	5 cc/200 mg	60 µm	30/box	186000683
Oasis® HLB Prospekt™ 1 cartridge*	2 mm x 10 mm/15 mg	30 µm	100/box	186000258
<b>NEW</b> Oasis® HLB Prospekt™ 2 cartridge**	1.0 mm x 10 mm	30 µm	96/box	186001196
Reservoir 30 cc for Oasis® cartridges			48/box	WAT011390
Reservoir 60 cc for Oasis® cartridges			12/box	WAT024659
Reservoir Adapter for 1 cc, 3 cc, 6 cc cartridges			10/box	WAT054260
Reservoir Adapter for 12 cc, 20 cc, 35 cc cartridges			10/box	WAT048160
Reservoir Adapter for 5 cc cartridges, Teflon			10/pkg	405000934
<b>NEW</b> Oasis® HLB column	2.1 mm x 20 mm	5 µm	1/pkg	186002034
<b>NEW</b> Oasis® HLB column	3.0 mm x 20 mm	5 µm	1/pkg	186002037
<b>NEW</b> Oasis® HLB column	3.9 mm x 20 mm	5 µm	1/pkg	186002040
Oasis® HLB cartridge column	3.9 mm x 20 mm	5 µm	1/pkg	186001413
<b>NEW</b> Oasis® HLB	4.6 mm x 20 mm	5 µm	1/pkg	186002043
<b>NEW</b> Oasis® HLB column	2.1 mm x 20 mm	15 µm	1/pkg	186002035
<b>NEW</b> Oasis® HLB column	3.0 mm x 20 mm	15 µm	1/pkg	186002038
<b>NEW</b> Oasis® HLB column	3.9 mm x 20 mm	15 µm	1/pkg	186002041
Oasis® HLB cartridge column	3.9 mm x 20 mm	15 µm	1/pkg	186001414
<b>NEW</b> Oasis® HLB column	4.6 mm x 20 mm	15 µm	1/pkg	186002044
Oasis® HLB column	2.0 mm x 15 mm	25 µm	1/pkg	186001792
<b>NEW</b> Oasis® HLB column	2.1 mm x 20 mm	25 µm	1/pkg	186002036
Oasis® HLB cartridge column	2.1 mm x 20 mm	25 µm	1/pkg	186000706
<b>NEW</b> Oasis® HLB column	3.0 mm x 20 mm	25 µm	1/pkg	186002039
<b>NEW</b> Oasis® HLB column	3.9 mm x 20 mm	25 µm	1/pkg	186002042
<b>NEW</b> Oasis® HLB column	4.6 mm x 20 mm	25 µm	1/pkg	186002045
Holder Kit for 2.1 mm x 20 mm cartridge column			1/pkg	186000262
Holder Kit for 3.9 mm x 20 mm cartridge column			1/pkg	WAT046910
Extraction Column Connector			1/pkg	WAT082745
Inline precolumn filter kit			1/pkg	WAT084560
Replacement filters			5/pkg	WAT005139
Replacement steel gaskets			1/pkg	WAT084567
<b>NEW</b> Oasis® HLB µElution Plate	96-well	30 µm	1/pkg	186001828BA
Oasis® filter plate	96-well		24/pkg	186001136
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

\* For use with Spark Holland Prospekt™ systems

\*\* For use with Spark Holland Symbiosis™ system

## OASIS® MCX SAMPLE EXTRACTION PRODUCTS (CATION-EXCHANGER)

Description		Particle Size	Quantity	Part No.
Oasis® MCX cartridge	1 cc/30 mg	30 µm	100/box	186000252
<b>NEW</b> Oasis® MCX Flangeless cartridge	1 cc/30 mg	30 µm	100/box	186001881
Oasis® MCX cartridge	1 cc/60 mg	60 µm	100/box	186000782
Oasis® MCX cartridge	3 cc/60 mg	30 µm	100/box	186000254
<b>NEW</b> Oasis® MCX Flangeless cartridge	3 cc/60 mg	30 µm	100/box	186001882
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	20 cc/60 mg	30 µm	50/box	186000261
Oasis® MCX Vac RC cartridge	20 cc/60 mg	60 µm	50/box	186000380
<b>NEW</b> Oasis® MCX Prospekt™ 2 cartridge**	10 mm x 1 mm	30 µm	96/box	186002098
<b>NEW</b> Oasis® MCX direct connect column	2.1 mm x 15 mm	30 µm	1/pkg	186002050
<b>NEW</b> Oasis® MCX column	2.1 mm x 20 mm	30 µm	1/pkg	186002046
<b>NEW</b> Oasis® MCX cartridge column	2.1 mm x 20 mm	30 µm	1/pkg	186002051
<b>NEW</b> Oasis® MCX column	3.0 mm x 20 mm	30 µm	1/pkg	186002047
<b>NEW</b> Oasis® MCX column	3.9 mm x 20 mm	30 µm	1/pkg	186002048
<b>NEW</b> Oasis® MCX column	4.6 mm x 20 mm	30 µm	1/pkg	186002049
<b>NEW</b> Oasis® MCX µElution Plate	96-well	30 µm	1/pkg	186001830BA
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® MAX SAMPLE EXTRACTION PRODUCTS (ANION-EXCHANGER)

Description		Particle Size	Quantity	Part No.
Oasis® MAX cartridge	1 cc/30 mg	30 µm	100/box	186000366
<b>NEW</b> Oasis® MAX Flangeless cartridge	1 cc/30 mg	30 µm	100/box	186001883
Oasis® MAX cartridge	3 cc/60 mg	30 µm	100/box	186000367
Oasis® MAX cartridge	3 cc/60 mg	60 µm	100/box	186000368
<b>NEW</b> Oasis® MCX Flangeless cartridge	3 cc/60 mg	60 µm	100/box	186001884
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	20 cc/30 mg	30 µm	50/box	186000372
Oasis® MAX Vac RC cartridge	20 cc/60 mg	30 µm	50/box	186000371
Oasis® MAX Vac RC cartridge	20 cc/60 mg	60 µm	50/box	186000378
<b>NEW</b> Oasis® MAX Prospekt™ 2 cartridge**	10 mm x 1 mm	30 µm	96/box	186002099
<b>NEW</b> Oasis® MAX direct connect column	2.1 mm x 15 mm	30 µm	1/pkg	186002056
<b>NEW</b> Oasis® MAX column	2.1 mm x 20 mm	30 µm	1/pkg	186002052
<b>NEW</b> Oasis® MAX cartridge column	2.1 mm x 20 mm	30 µm	1/pkg	186002057
<b>NEW</b> Oasis® MAX column	3.0 mm x 20 mm	30 µm	1/pkg	186002053
<b>NEW</b> Oasis® MAX column	3.9 mm x 20 mm	30 µm	1/pkg	186002054
<b>NEW</b> Oasis® MAX column	4.6 mm x 20 mm	30 µm	1/pkg	186002055
<b>NEW</b> Oasis® MAX µElution Plate	96-well		1/pkg	186001829
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® MAX plate	60 mg/96-well	60 µm	1/pkg	186001205

\*\* For use with Spark Holland Symbiosis™ system

## OASIS® METHOD DEVELOPMENT KIT

Description	Quantity	Particle Size	Quantity	Part No.
Oasis® Method Development Kit	3 cc/60 mg	30 µm	10 each MCX, HLB, MAX	186000867

## MANIFOLD FOR EXTRACTION PLATE

Description	Quantity	Part No.
Extraction plate manifold for Oasis 96-well plates	1/box	186001831
Extraction Plate Manifold Kit A (includes extraction plate manifold, reservoir tray, 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

## MANIFOLD FOR EXTRACTION CARTRIDGES

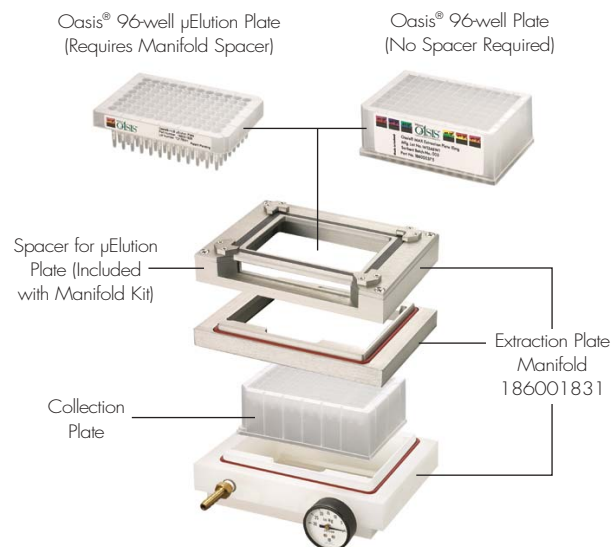
Description	Part No.
Waters extraction manifold, 20-position without rack (includes 20 needle tips, 25 plugs, and ejector tool)	WAT200677
Waters extraction manifold, 20-position (complete with rack for 13 mm x 75 mm tubes)	WAT200606
Waters extraction manifold, 20-position (complete with rack for 13 mm 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

## ACCESSORIES FOR EXTRACTION COLUMNS AND CARTRIDGES

Description	Quantity	Part No.
Holder Kit for 2.1 mm x 20 mm cartridge column	1/pkg	186000262
Holder Kit for 3.9 mm x 20 mm cartridge column	1/pkg	WAT046910
Extraction Column Connector	1/pkg	WAT082745
In-line precolumn filter kit	1/pkg	WAT084560
Replacement filters	5/pkg	WAT005139
Replacement steel gaskets	1/pkg	WAT084567

## ACCESSORIES FOR EXTRACTION PLATE MANIFOLD

Description	Quantity	Part No.
Disposable Reservoir tray	25/box	WAT058942
Sample collection plate, 350 µL	50/box	WAT058943
Sample collection plate, 2 mL	50/box	WAT058958
Sealing cap for 96-well collection plate	50 sheets/pkg	WAT058959



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