

# ADME/DMPK

Onyx™ Monolithic HPLC Solutions Specifically for ADME and DMPK Departments

**Phenomenex understands that those working in ADME & DMPK departments are constantly given large numbers of samples to analyze, but are also given short deadlines to work with. However, with all systems in full operation, how can laboratories be expected to generate more data in the same amount of time and with the same resources? Let's take a look at some current solutions in the industry.**

## **Current solutions for increasing sample throughput**

### **1) You are using a 30mm (or shorter) length columns...**

And cannot shorten your method any further without losing your polar compounds in the column void.

Or, you are already losing your polar metabolite in the void volume, where your mass spectrometer can't see it, and it's the main metabolite.

### **2) Your analytical column is already running at 2.5 mL/min...**

And the backpressure spikes dangerously close to overpressure with each injection.

Or, you enter the lab in the morning to see an entire sample series halted due to an overpressure, 8 hours ago.

### **3) You try shortening your equilibration time...**

But carryover increases and retention times start varying widely.

Or, you discover that your MS was not quantitating your compound because it was outside its retention time (RT) window and you have to repeat an entire series, all 10,000 samples.

## **Does this sound better?**

- You have a very fast method with less than a two-minute cycle time.
- Your method runs at 4mL/min with a backpressure of 150 bar and with minimal pressure rise on injection.
- Your polar metabolites are separated from the void volume and detected by MS.
- Retention times and peak shapes remain the same from the first to last injection of a large series.

## **Onyx is your answer for increasing throughput**

**Please read on to learn more!**

## Anti-Hypertensives in plasma

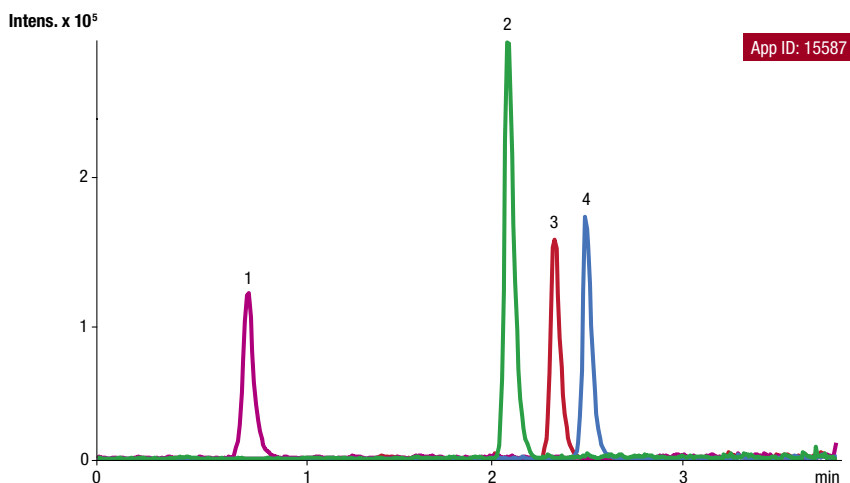
**Background:** Several related drug compounds in plasma sample. Samples precipitated with organic and run through a protein precipitation plate (PPT).

**#1 Challenge:** *Maintain compound retention, separation, and peak shape even though sample is in 80% organic.*

**Solution:** Macroporous structure of Onyx mixes solvent slug quickly. Compound retains on phase and still maintains excellent separation.

**#2 Challenge:** *Avoiding flow restrictions and overpressures due to salts, unprecipitated proteins, sugars, and lipids present in the sample.*

**Solution:** The low backpressure of Onyx makes overpressures unlikely even at very high flow rates. Also, the through-pores of the media make Onyx less likely to "plug up" from matrix contaminants versus particulate columns.



**Sample Preparation:** A 200 $\mu$ L sample of porcine plasma was spiked with 2 $\mu$ g/mL drug mixture and then precipitated with 800 $\mu$ L acetonitrile and filtered through a Phenomenex Impact™ Protein Precipitation Plate

**Column:** Onyx Monolithic C18

**Dimensions:** 100 x 4.6mm

**Order no.:** CH0-7643

**Mobile phase:** A: 0.1% Formic acid in Water  
B: Acetonitrile

**Gradient:** 10-65% B in 4.0min

**Flow rate:** 4.0 mL/min

**Temperature:** Ambient

**Detection:** LC/MS ESI+

**Injection:** 1. Pseudoephedrine (m/z = 166)  
2. Propranolol (m/z = 260)  
3. Diltiazem (m/z = 415)  
4. Verapamil (m/z = 455)

## Diazepam and metabolite in urine

**Background:** Monitoring of a pharmaceutical compound and its metabolite in urine. Sample is directly injected via “dilute and shoot” method onto column.

**#1 Challenge:** *“Dilute and shoot” contains large amounts of proteins as well as other contaminants that can potentially clog the column quickly.*

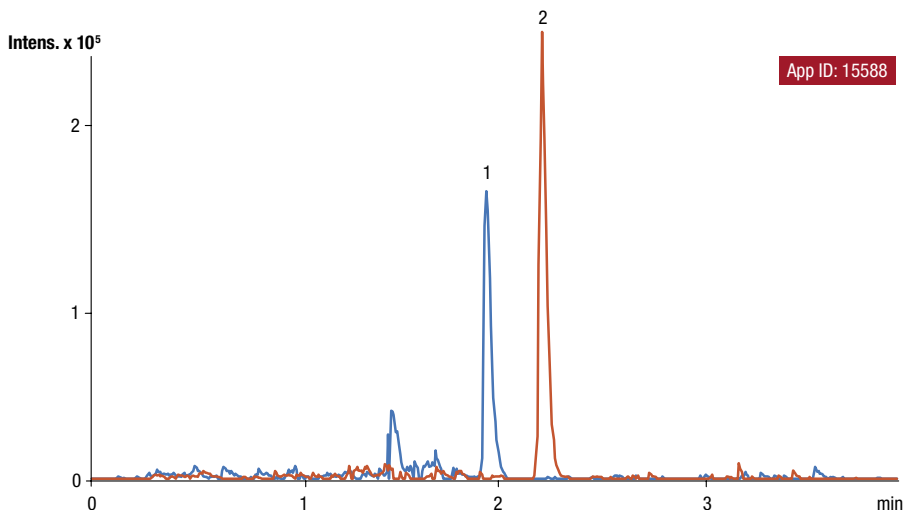
**Solution:** Wide macropores (2 $\mu$ m) of Onyx reduce interference due to proteins present in sample and allow sample to easily pass through column.

**#2 Challenge:** *High throughput method needed with short run time.*

**Solution:** Monolithic structure allows for rapid gradients with very short re-equilibration times resulting in methods less than 4 minutes.

**#3 Challenge:** *Sample carryover can be problematic with complex samples.*

**Solution:** Improved flow characteristics of monoliths result in lower sample carryover, especially for complex matrices like urine and plasma.



**Sample Preparation:** Human urine sample diluted 1:1 with water. 50 $\mu$ L Injected.  
**Column:** Onyx Monolithic C18  
**Dimensions:** 100 x 4.6mm  
**Order no.:** CH0-7643  
**Mobile phase**  
 A: 0.1% Formic acid in Water  
 B: Acetonitrile  
**Gradient:** 5 - 95% B in 4.0min  
**Flow rate:** 4.0 mL/min  
**Temperature:** Ambient  
**Detection:** LC/MS ESI+  
**Injection:**  
 1. Nordiazepam (*Diazepam metabolite*) (m/z = 271)  
 2. Diazepam (m/z = 285)

## Key Onyx™ features & benefits for ADME and DMPK

### 1) High throughput with low backpressures

- Onyx columns allow for higher flow rates, up to 9 mL/min, with backpressures typically 60% less than particulate columns.
- Onyx monolithic silica technology delivers shorter column equilibration times for further increases in throughput.

### 2) High loading

- The dual pore structure of Onyx (2µm macropore, 130Å mesopore) ensures good loading with a high surface area (300m<sup>2</sup>/g) and excellent efficiency, while having maximum flow characteristics for low backpressures.

### 3) Minimal inlet clogging/“dilute and shoot”

- The macropore structure (2µm pore size) has less potential for sample clogging (vs. particulate columns) making it ideal for “dilute and shoot” applications as well as protein precipitated samples from very complex matrices like plasma and urine. This results in less time needed for sample preparation.

## Onyx products for ADME & DMPK

| Order No. | Description   |
|-----------|---|
| CH0-7645  | Onyx C18 25 x 4.6   |
| CH0-7644  | Onyx C18 50 x 4.6   |
| CH0-7643  | Onyx C18 100 x 4.6  |
| CH0-7647  | Onyx C8 100 x 4.6   |
| KJ0-7651  | Onyx C18 Guard Cartridge Kit<br>(3 pk 5 x 4.6mm cartridges + holder + wrench) |
| CH0-7649  | Onyx C18 Guard Cartridges 5 x 4.6mm (3/pk)                                    |
| AQ0-7654  | Onyx Column coupler   |



Phenomenex product based on monolithic technology under license from Merck KGaA, Darmstadt, Germany.



[www.phenomenex.com](http://www.phenomenex.com)

Phenomenex products are available worldwide. For the distributor in your country, contact Phenomenex USA, International Department by telephone, fax or e-mail: [international@phenomenex.com](mailto:international@phenomenex.com).

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