

**Hypersil™ GOLD Columns  
TG 04-01**



**The Key to Unsurpassed Peak Shape**

# Hypersil GOLD Columns

## Introduction

Hypersil™ GOLD columns offer unsurpassed peak shape. Based on highly pure silica, Hypersil GOLD columns provide the ultimate in symmetrical peaks, even when analyzing compounds that give notoriously poor peak shape on traditional silica-based chemistries. Hypersil GOLD media provides a stationary phase with C18 selectivity and a predictable elution order, but can provide new capabilities such as improved peak shape, increased peak capacity, and greater sensitivity, especially for trace compound analysis.

PHASE	PARTICLE SIZE	CARBON LOAD	PORE SIZE	END-CAPPING	SILICA TYPE
Hypersil GOLD	3, 5 and 8 µm	10%	175Å	Yes	Highly pure base deactivated

Table 1. Specifications

## Unrivaled Peak Shape

Obtaining symmetrical peak shapes is critical to ensuring that optimum resolution and sensitivity are achieved for basic pharmaceutical compounds. Hypersil GOLD columns use proprietary bonding technology to make certain that the best possible peak shape is obtained, producing data with the highest confidence in the accuracy and quality of results.

Peak asymmetry (As) can be used to measure the quality of a column, and is defined as the ratio of the width of the tail of the peak to the width of the front of the peak, measured either at 5 or 10% peak height. One way to characterize the asymmetry of a peak is the tailing factor used by the U.S. Pharmacopeia, defined as:

$$T_f = \frac{(a+b)}{2a}$$

where **a** is defined as the width of the front of the peak and **b** is the width of the tail of the peak (measured at 5% peak height). This is illustrated in figure 1.

Basic analytes can tail even when a column gives good peak shape for neutral species. This can lead to a loss of sensitivity, resolution and reproducibility. Symmetrical peaks lead to better performance in terms of efficiency, sensitivity, critical pair analysis, and reproducibility. Figure 2 shows a comparison of peak shape obtained with a Hypersil GOLD column compared to a competitor's typical type-B, pure silica-based C18. Both show good peak shape for the neutral analyte, but tailing is seen for the basic analyte on the competitor's column.

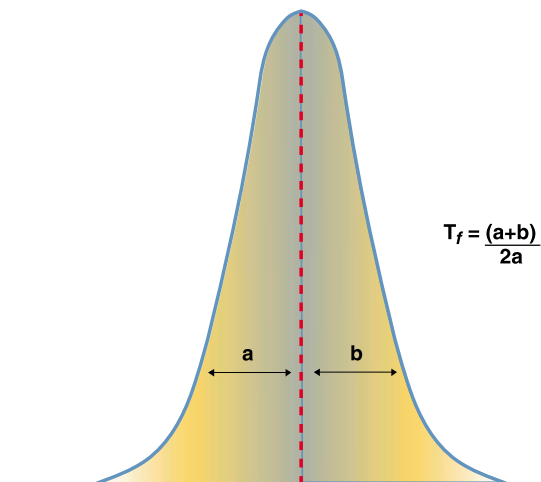


Figure 1: A Gaussian peak will give an asymmetry value of 1.

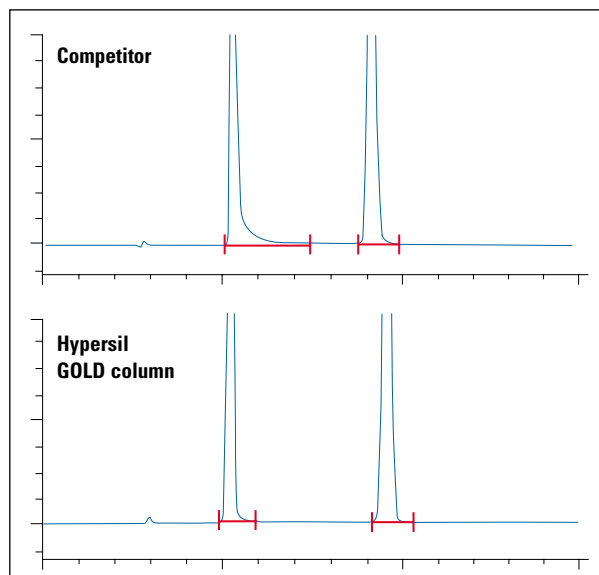


Figure 2: Hypersil GOLD columns offer improved peak shape, even for basic analytes.

## Critical Resolution

The separation between 2 peaks is the resolution, defined as:

$$Rs = \frac{2(t_2 - t_1)}{(w_1 + w_2)}$$

where **t** is the retention time of the 2 peaks, and **w** is the peak width, measured in the same units. Resolution is adversely affected by peak tailing. Obtaining distinct peaks with  $Rs > 1.5$  is the target to achieve accuracy of quantitation. Hypersil GOLD columns assist in the resolution of closely eluting compounds (figure 3) by providing the best possible peak shapes obtainable. Critical eluting peaks or related substances can also be potentially resolved by the extra capacity provided by the unique bonding and proprietary end-capping processes used in the manufacturing of Hypersil GOLD columns.

## Enhanced Sensitivity

As analytes are subjected to unwanted interactions with the stationary phase, they begin to show non-Gaussian peak shape. This asymmetrical peak shape leads to a loss in peak height which can result in a decrease in the accuracy of quantitative data. Hypersil GOLD columns provide the most efficient peak shapes possible, ensuring that peak height is maximized and trace analyses are not compromised.

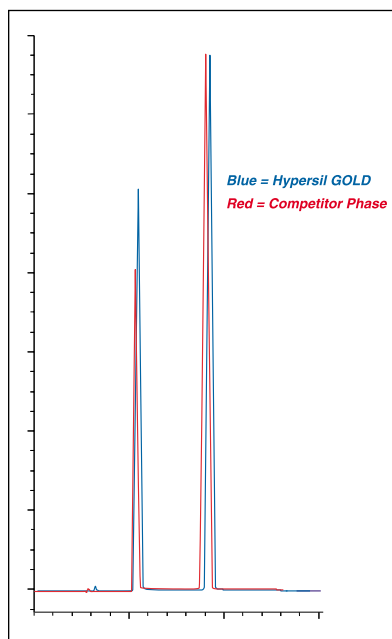


Figure 4: Hypersil GOLD produces optimum peak shapes for basic analytes, therefore providing maximum peak height for sensitivity of trace compounds.

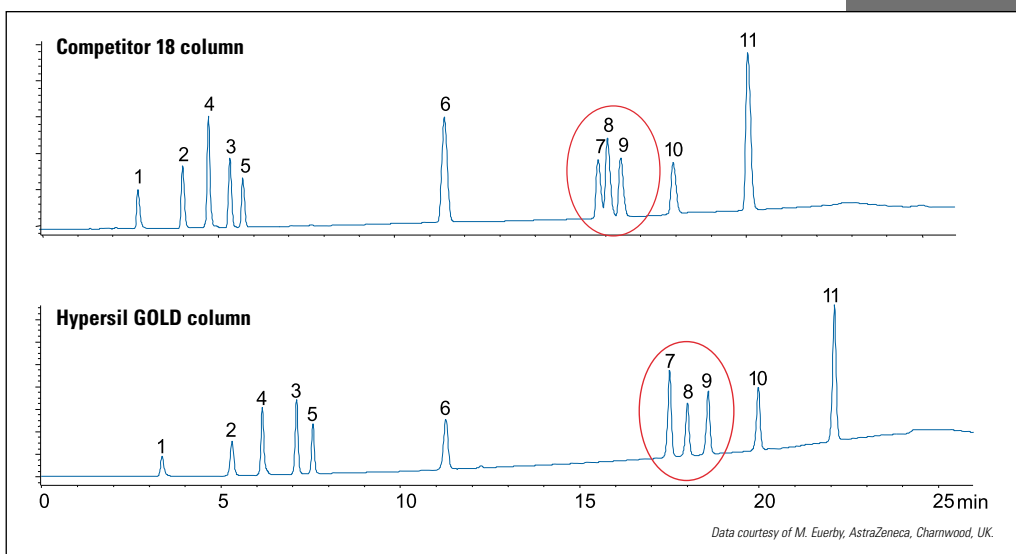


Figure 3: Resolution of analytes is improved using a Hypersil GOLD column.

## pH Stability

Hypersil GOLD columns were tested and stability was shown with up to 650 injections at pH 10.6 (figure 5) and 1500 injections at pH 1.8. These tests are not representative of every sample under any extended pH mobile phase, but does demonstrate the applicability of Hypersil GOLD columns for extended pH applications.

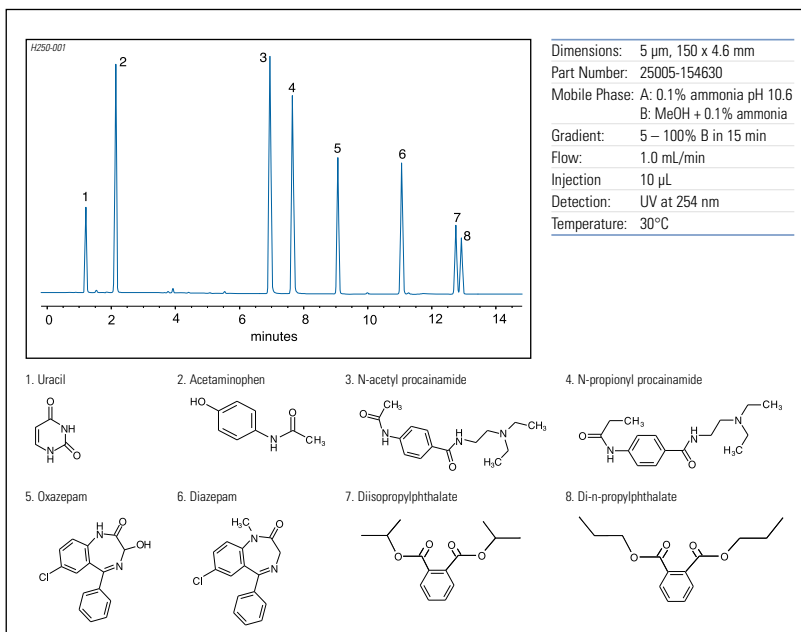
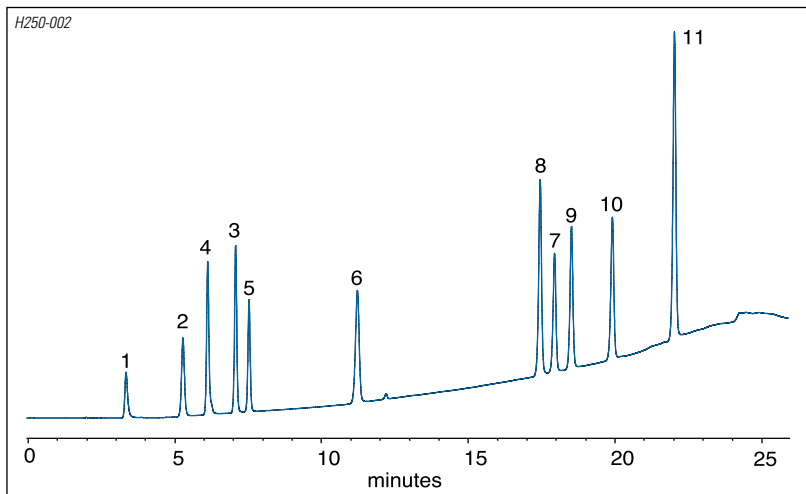


Figure 5: High pH stability (pH 10.6) of Hypersil GOLD columns.

# Applications

## Hydrophilic and Hydrophobic Bases

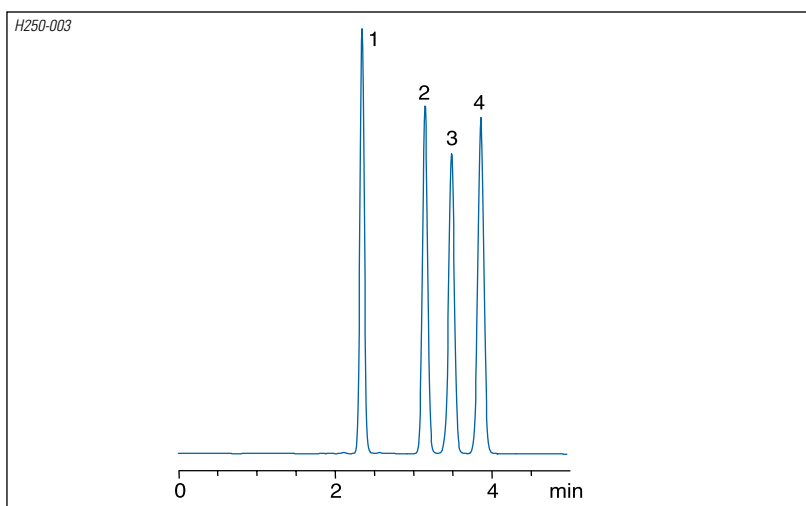


1-11. Proprietary compounds

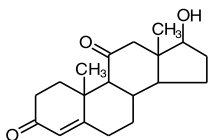
Dimensions:	5 $\mu$ m, 150 x 3.0 mm
Part Number:	25005-153030
Mobile Phase:	A: 20 mM $\text{KH}_2\text{PO}_4$ pH2.7 B: A + MeOH 35:65
Gradient:	5 – 100% B in 20 min
Flow:	0.5 mL/min
Detection:	UV at 210 nm
Temperature:	40°C

Data courtesy of M. Euerby, Astra Zeneca

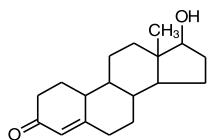
## Testosterones



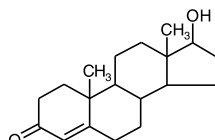
1. 11-Ketotestosterone



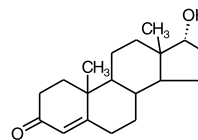
2. 19-Nortestosterone



3. Testosterone



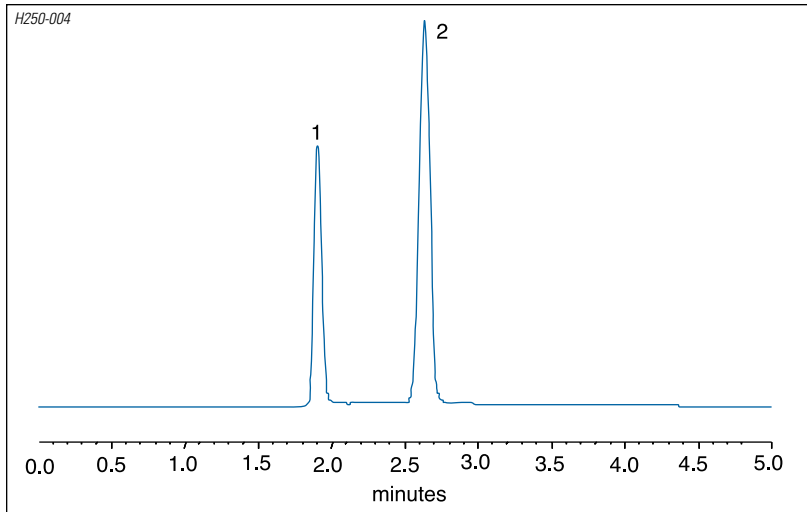
4. Epitestosterone



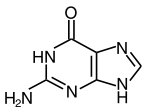
Dimensions:	5 $\mu$ m, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	$\text{H}_2\text{O}$ :ACN 43:57
Flow:	1.0 mL/min
Detection:	UV at 254 nm
Temperature:	25°C



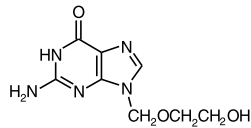
## Acyclovir



1. Guanine

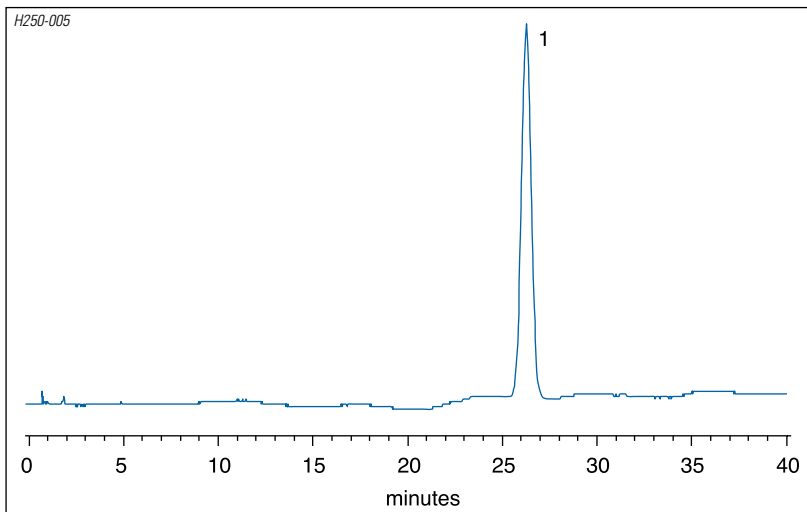


2. Acyclovir

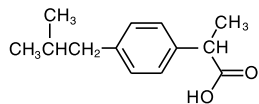


Dimensions:	5 µm, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% formic acid B: ACN + 0.1% formic acid
Gradient:	5 – 100% B in 15 min
Flow:	1.0 mL/min
Detection:	254 nm
Temperature:	ambient

## Ibuprofen BP



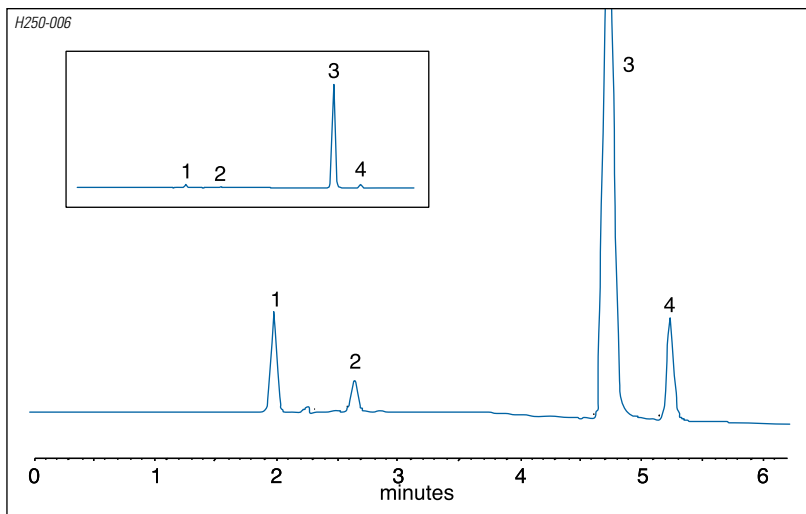
1. Ibuprofen



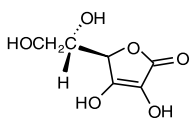
Dimensions:	5 µm, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	H <sub>3</sub> PO <sub>4</sub> :ACN:H <sub>2</sub> O (0.5:340:659.5)
Flow:	2.0 mL/min
Detection:	UV at 214 nm
Temperature:	25°C



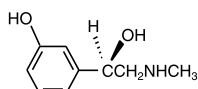
## Components of a Cold Remedy



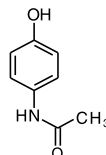
1. Ascorbic acid



2. Phenylephrine



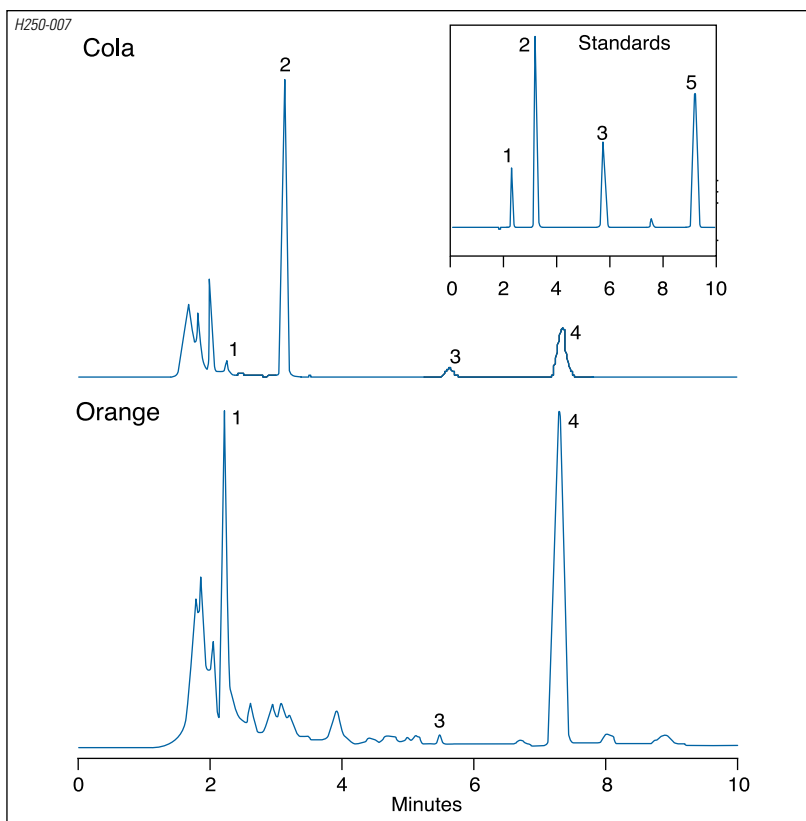
3. Acetaminophen



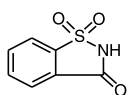
4. Related compound

Dimensions:	5 μm, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% formic acid B: MeOH + 0.1% formic acid
Flow:	1.0 mL/min
Injection	10 μL
Detection:	UV at 280 nm
Temperature:	40°C

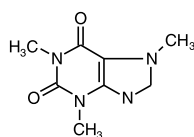
## Soft Drink Additives



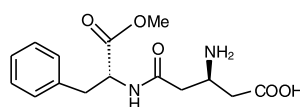
1. Saccharin



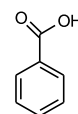
2. Caffeine



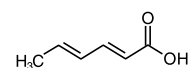
3. Aspartame



4. Benzoic acid

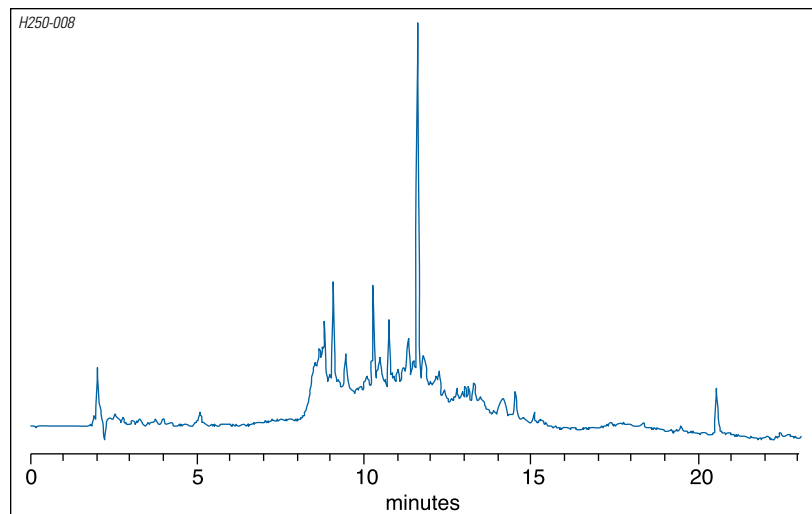


5. Sorbic acid



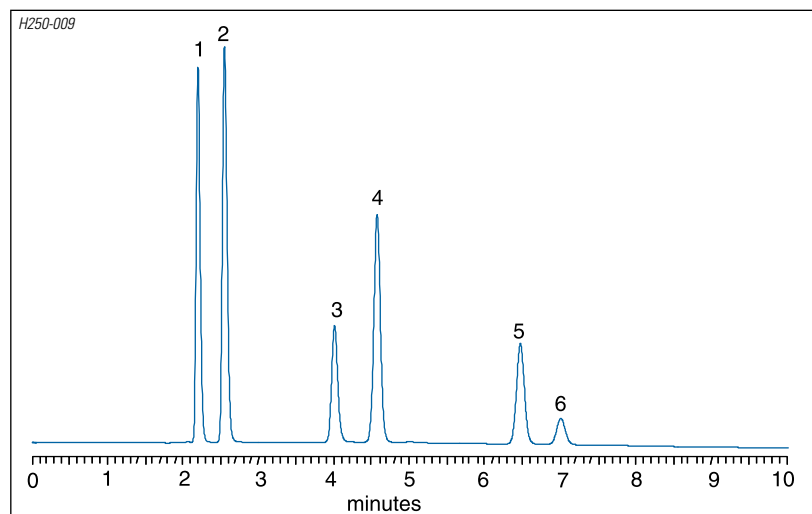
Dimensions:	5 μm, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: 20 mM NH <sub>4</sub> OAc pH4.1 B: MeOH Isocratic A:B (65:35)
Flow:	1.0 mL/min
Injection	samples 20 μL
Detection:	UV at 254 nm
Temperature:	25°C

## Casein Tryptic Digest



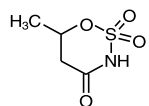
Dimensions:	5 $\mu$ m, 150 x 4.6 mm	
Part Number:	25005-154630	
Mobile Phase:	A: 0.05% TFA B: ACN:H <sub>2</sub> O (9:1) + 0.035% TFA	
Gradient:	Time	%B
	0	0
	3	0
	23	90
Flow:	1.0 mL/min	
Injection	20 $\mu$ L @ 1.0 mg/mL	
Detection:	UV at 195 nm	
Temperature:	25°C	

## Energy Drink Additives

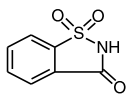


Dimensions:	5 $\mu$ m, 150 x 4.6 mm	
Part Number:	25005-154630	
Mobile Phase:	A: 10 mM NH <sub>4</sub> OAc pH5 B: MeOH	
Gradient:	30 – 45% B in 10 min	
Flow:	1.0 mL/min	
Detection:	UV at 230 nm	
Temperature:	25°C	

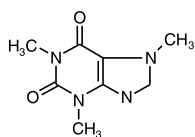
1. Acesulfame



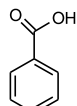
2. Saccharin



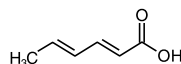
3. Caffeine



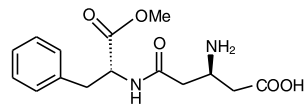
4. Benzoic acid



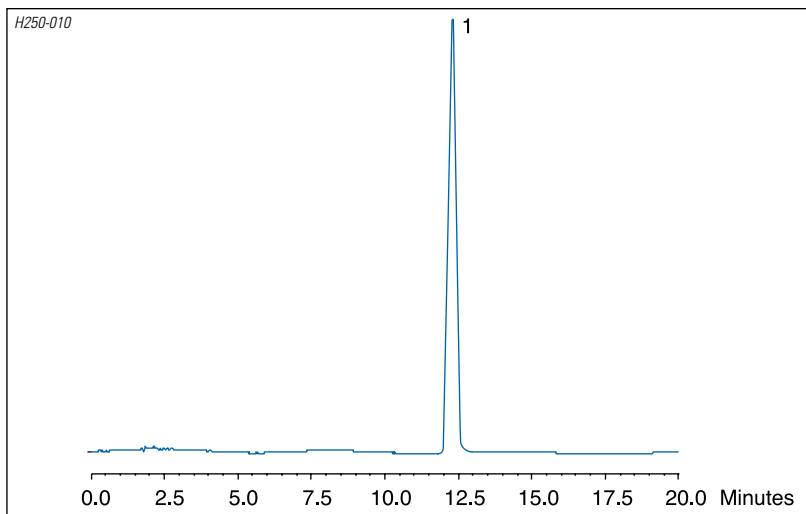
5. Sorbic acid



6. Aspartame

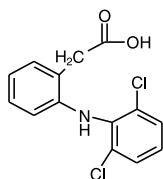


## Diclofenac Tablet

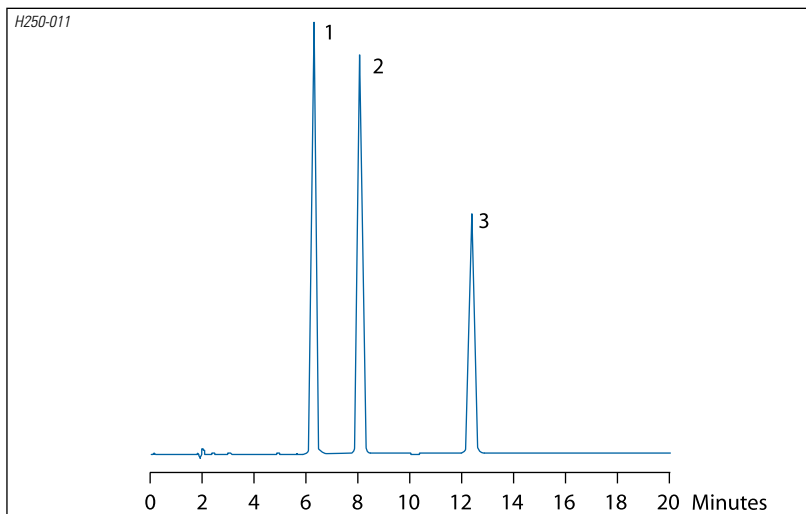


Dimensions:	5 $\mu$ m, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: 10 mM $\text{NaH}_2\text{PO}_4$ pH2.5 B: MeOH
Gradient:	A:B (34:66)
Flow:	1.0 mL/min
Detection:	UV at 254 nm
Temperature:	25°C

1. Diclofenac

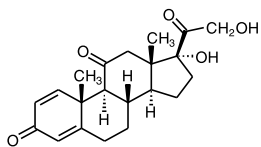


## Anabolic Steroids

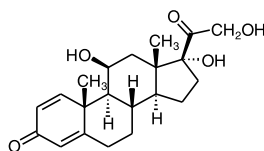


Dimensions:	5 $\mu$ m, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: $\text{H}_2\text{O}$ + 0.1% formic acid B: MeOH + 0.1% formic acid
Gradient:	Time      %B
	0            50
	20          60
Flow:	1.0 mL/min
Detection:	UV at 254 nm
Temperature:	25°C

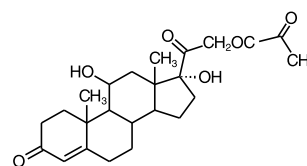
1. Prednisone



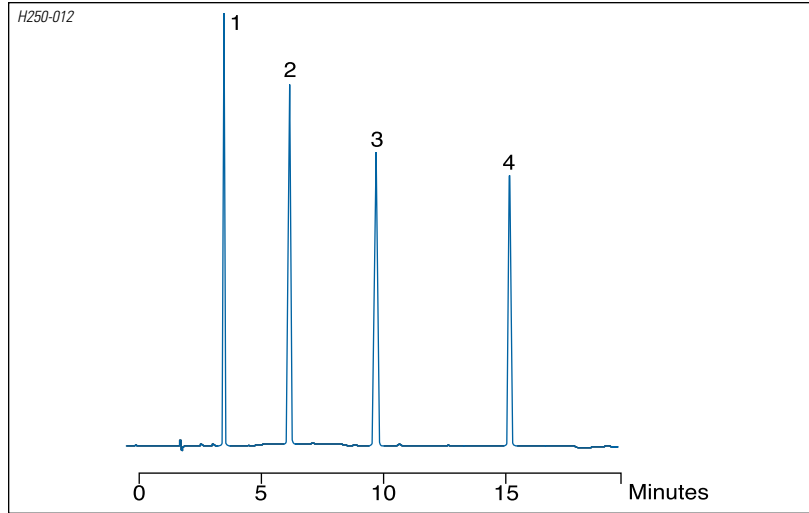
2. Prednisolone



3. Hydrocortisone-21-acetate

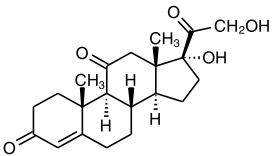


## Anabolic Steroids

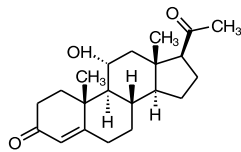


Dimensions:	5 $\mu$ m, 150 x 4.6 mm	
Part Number:	25005-154630	
Mobile Phase:	A: H <sub>2</sub> O + 0.1% formic acid B: MeOH + 0.1% formic acid	
Gradient:	Time	%B
	0	35
	20	70
Flow:	1.0 mL/min	
Detection:	UV at 254 nm	
Temperature:	25°C	

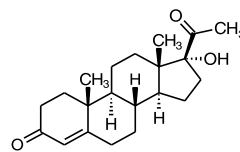
1. Cortisone



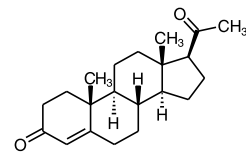
2. 11- $\alpha$ -Hydroxyprogesterone



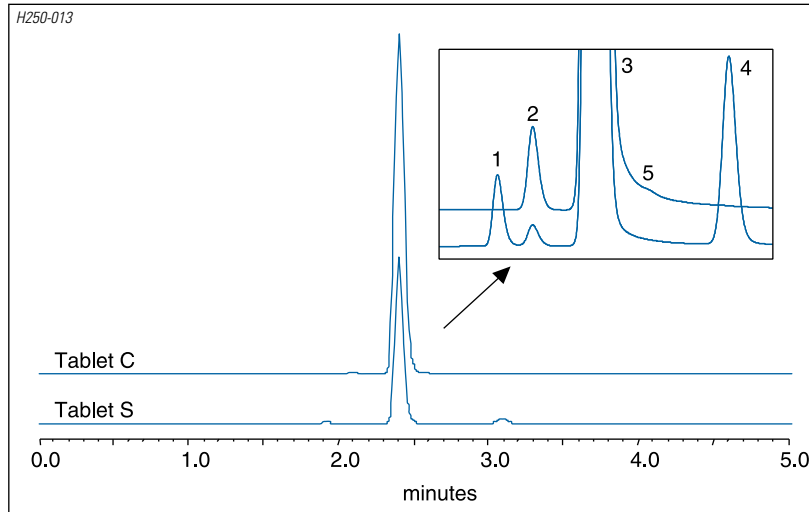
3. 17- $\alpha$ -Hydroxyprogesterone



4. Progesterone

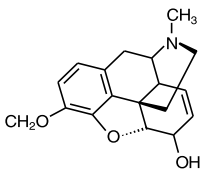


## Analgesic Tablets

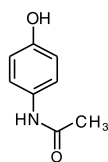


Dimensions:	5 $\mu$ m, 150 x 4.6 mm	
Part Number:	25005-154630	
Mobile Phase:	A: 10 mM NaH <sub>2</sub> PO <sub>4</sub> pH2.5 B: MeOH	
Isocratic:	A:B (65:35)	
Flow:	1.0 mL/min	
Detection:	UV at 230 nm	
Temperature:	25°C	

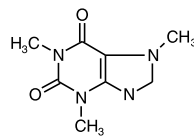
2. Codeine



3. Acetaminophen



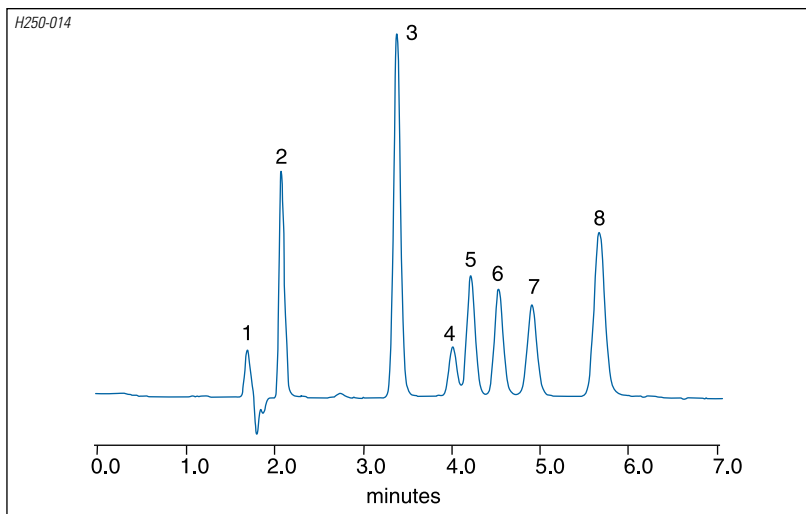
4. Caffeine



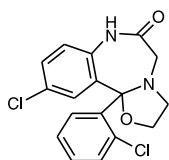
1 & 5. Tablet components



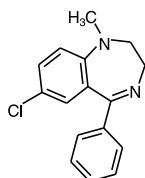
## Benzodiazepine Mix



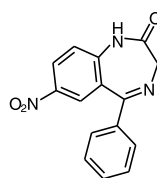
1. Cloxazolam



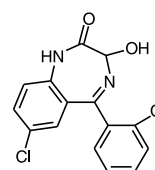
2. Medazepam



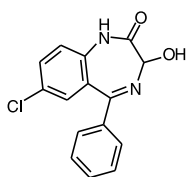
3. Nitrazepam



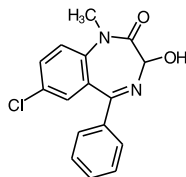
4. Lorazepam



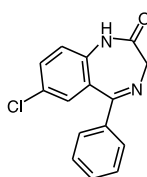
5. Oxazepam



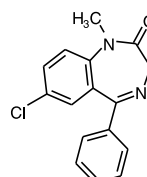
6. Temazepam



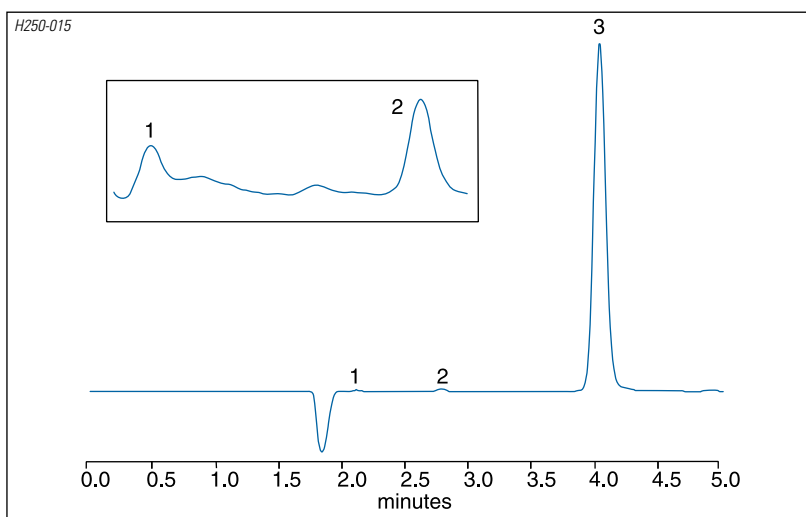
7. Nordiazepam



8. Diazepam

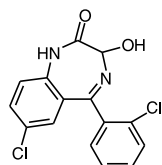


## Lorazepam Tablet



1 & 2. Tablet components

3. Lorazepam



Dimensions: 5  $\mu$ m, 150 x 4.6 mm

Part Number: 25005-154630

Mobile Phase: A: 0.1% formic acid

B: MeOH + 0.1% formic acid

Isocratic: A:B (35:65)

Flow: 1.0 mL/min

Detection: UV at 235 nm

Temperature: 25°C

Dimensions: 5  $\mu$ m, 150 x 4.6 mm

Part Number: 25005-154630

Mobile Phase: A: 0.1% formic acid

B: MeOH + 0.1% formic acid

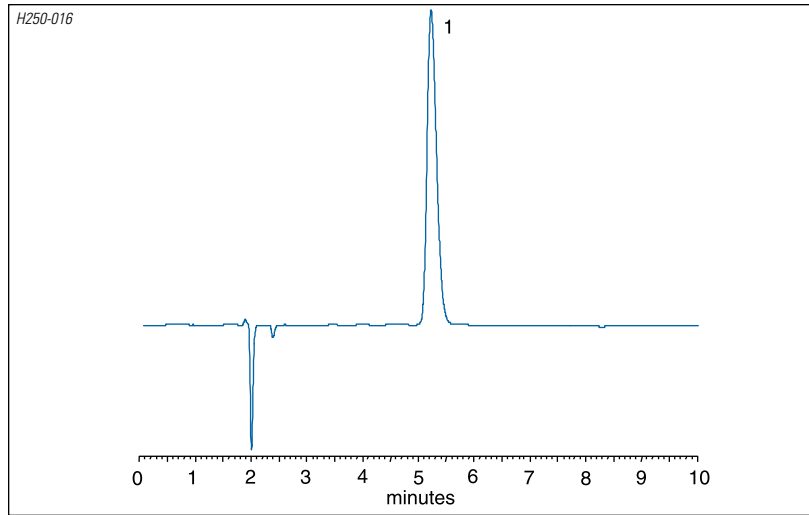
Isocratic: A:B (35:65)

Flow: 1.0 mL/min

Detection: UV at 235 nm

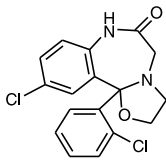
Temperature: 25°C

# Cloxazolam Tablet

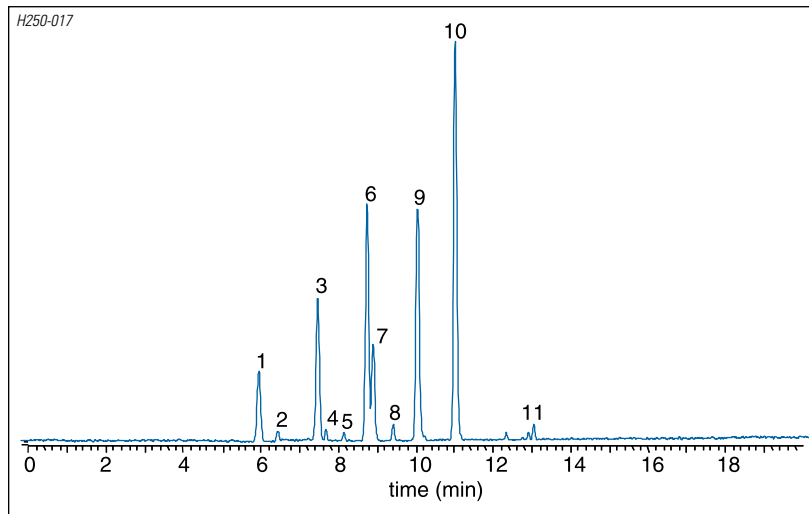


Dimensions:	5 µm, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% formic acid B: MeOH + 0.1% formic acid
Isocratic:	A:B (70:30)
Flow:	1.0 mL/min
Detection:	UV at 235 nm
Temperature:	25°C

1. Cloxazolam



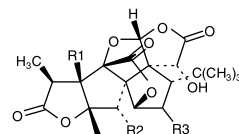
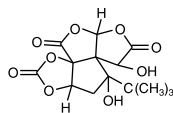
# Ginkgo Biloba Standards



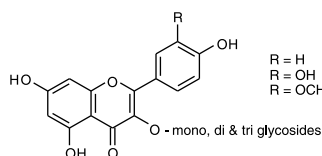
Dimensions:	5 µm, 50 x 2.1 mm
Part Number:	25005-052130
Mobile Phase:	A: H <sub>2</sub> O + 0.1% formic acid B: MeOH + 0.1% formic acid
Gradient:	5 to 100% B in 15 min
Flow:	0.3 mL/min
Temperature:	30°C
Detection:	Negative ESI (450°C, 4kV, 18V scan 70 – 600 u)

1. Bilobalide
2. Compound associated with Bilobalide
3. Ginkgolide C
4. Compound associated with Ginkgolide C
5. Compound associated with Ginkgolide A
6. Ginkgolide A
7. Ginkgolide B
8. Compound associated with Ginkgolide A
9. Quercetin
10. Kaempferol
11. Compound associated with Kaempferol

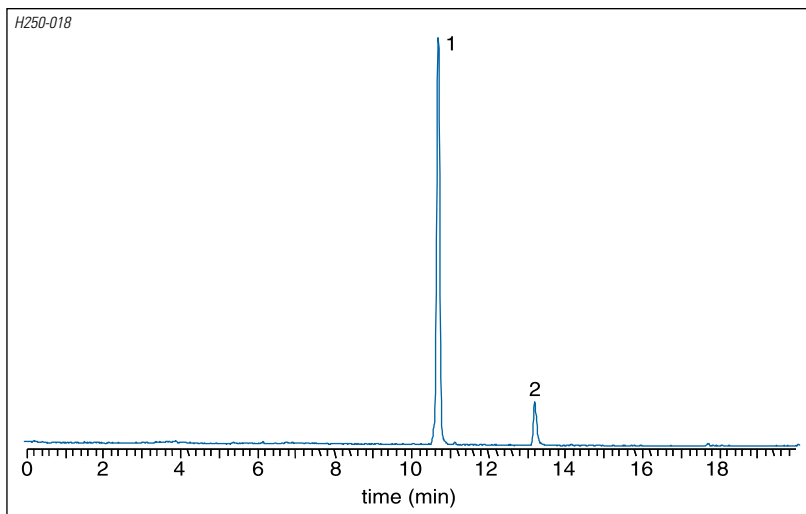
1. Bilobalide



R1	R2	R3	Ginkgolide
OH	H	H	A
OH	OH	H	B
OH	OH	OH	C
H	OH	OH	M
OH	H	OH	J

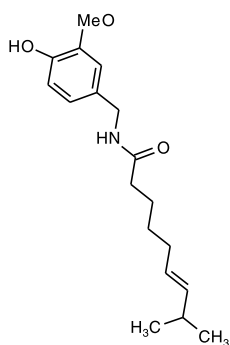


## Capsaicin Standard



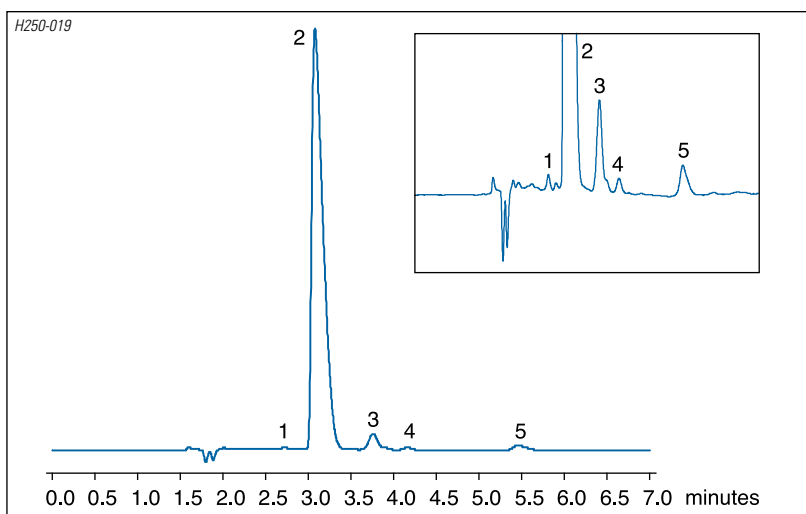
1. Capsaicin

2. Related component



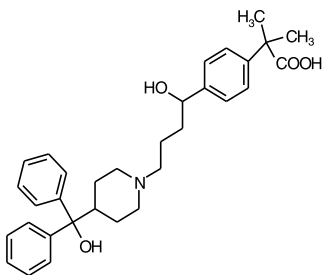
Dimensions:	5 $\mu$ m, 50 x 2.1 mm
Part Number:	25005-052130
Mobile Phase:	A: H <sub>2</sub> O + 0.1% formic acid B: ACN + 0.1% formic acid
Gradient:	5 to 100% B in 15 min
Flow:	0.3 mL/min
Temperature:	30°C
Detection:	Positive ESI (450°C, 4.5kV, 18V scan 70 – 600 u)

## Fexofenadine Tablet



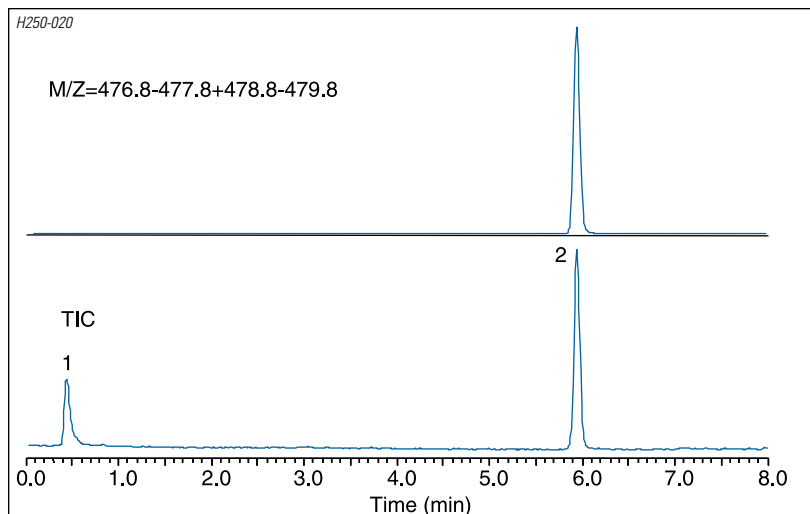
2. Fexofenadine

1, 3, 4, 5. Tablet components

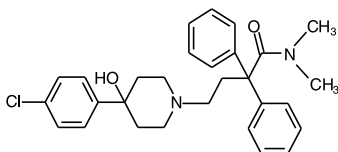


Dimensions:	5 $\mu$ m, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% formic acid B: MeOH + 0.1% formic acid
Isocratic:	A:B (40:60)
Flow:	1.0 mL/min
Detection:	UV at 254 nm
Temperature:	25°C

## Loperamide Hydrochloride Tablet

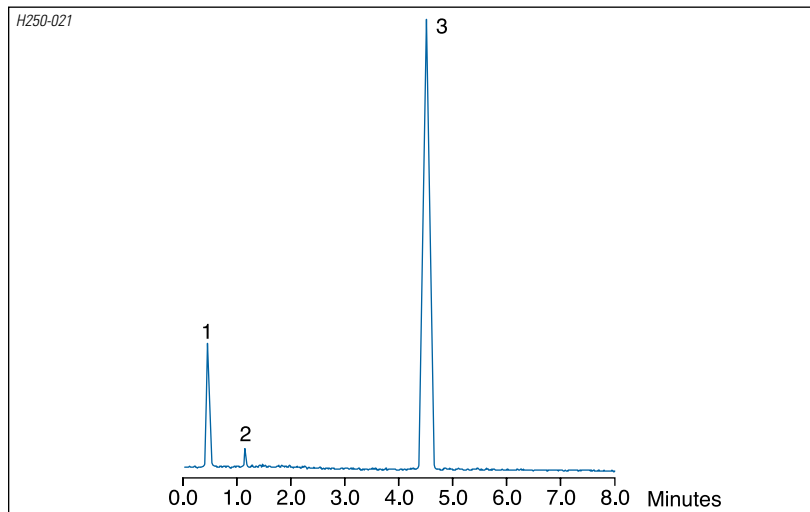


1.  $t_0$                       2. Loperamide (HCl salt)



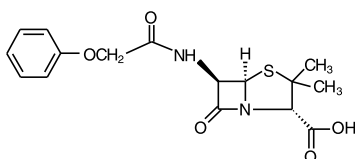
Dimensions:	5 $\mu$ m, 50 x 2.1 mm
Part Number:	25005-052130
Mobile Phase:	A: H <sub>2</sub> O + 0.1% formic acid B: ACN + 0.1% formic acid
Gradient:	25 to 100% B in 10 min
Flow:	0.3 mL/min
Temperature:	30°C
Tablet Solution:	1mg/mL in water
Detection:	Positive ESI (450°C, 4.5kV, 18V, scan 100 – 600 u)

## Penicillin V Tablet



1.  $t_0$                       2. Tablet component

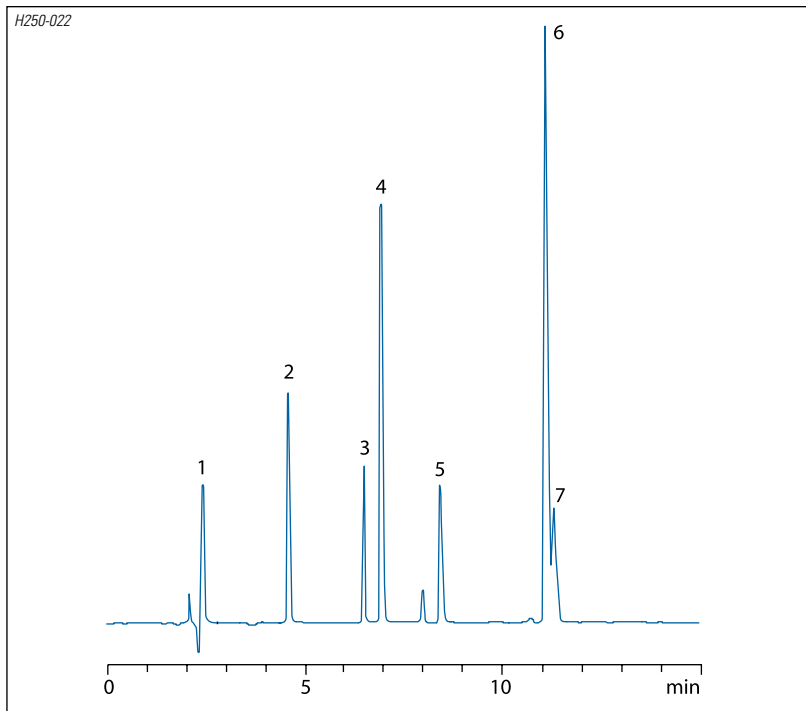
3. Penicillin V (phenoxymethylpenicillanic acid)



Dimensions:	5 $\mu$ m, 50 x 2.1 mm
Part Number:	25005-052130
Mobile Phase:	A: H <sub>2</sub> O + 0.1% formic acid B: ACN + 0.1% formic acid
Gradient:	25 to 100% B in 10 min
Flow:	0.3 mL/min
Temperature:	30°C
Tablet Solution:	1mg/mL in water
Detection:	Positive ESI (450°C, 4.5kV, 18V, scan 100 – 600 u)

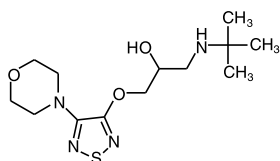


## Betablockers

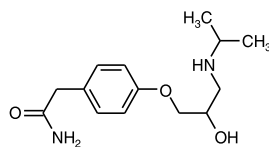


Dimensions:	5 μm, 150 x 4.6 mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% formic acid B: ACN + 0.1% formic acid
Gradient:	5 – 55% in 15 min
Flow:	1.0 mL/min
Detection:	UV at 220 nm
Temperature:	25°C

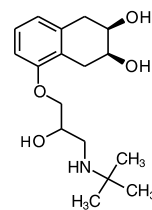
1. Timolol



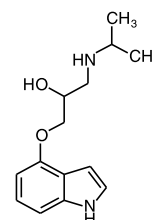
2. Atenolol



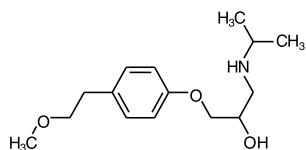
3. Nadolol



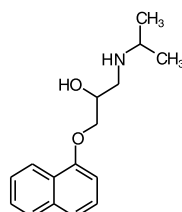
4. Pindolol



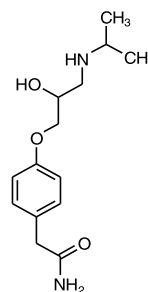
5. Metoprolol



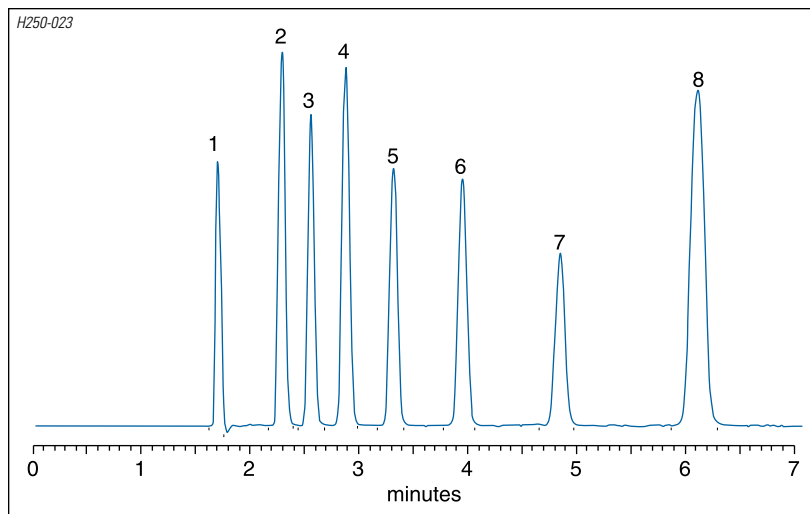
6. Propranolol



7. Adrenolol

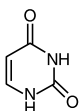


## Phenone Test Mix

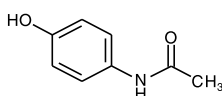


Dimensions: 5  $\mu$ m, 150 x 4.6 mm  
 Part Number: 25005-154630  
 Mobile Phase: A: 0.1% formic acid  
 B: ACN + 0.1% formic acid  
 Isocratic: A/B (25/75)  
 Flow: 1.0 mL/min  
 Temperature: 25°C  
 Detection: UV at 215 nm

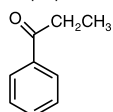
1. Uracil



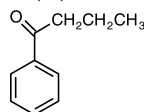
2. Acetophenone



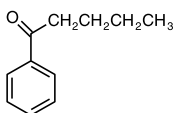
3. Propiophenone



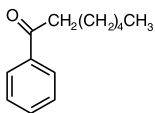
4. Butyrophenone



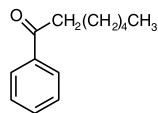
5. Valerophenone



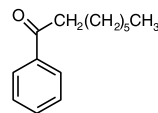
6. Hexanophenone



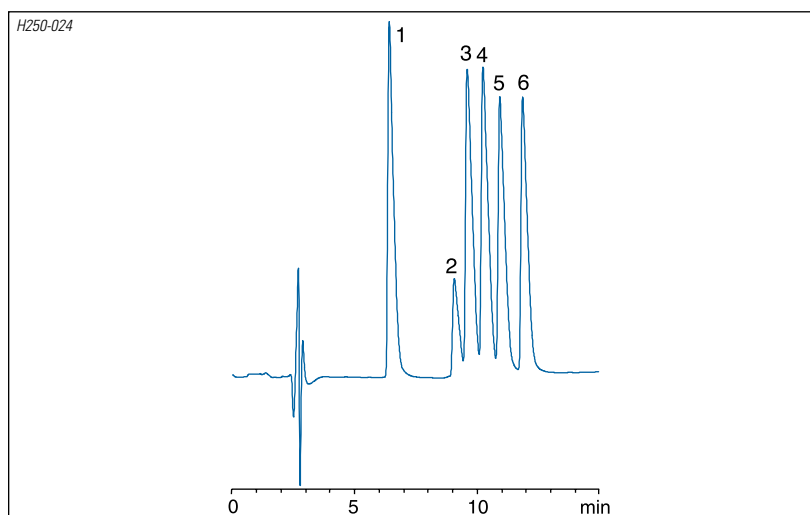
7. Heptanophenone



8. Octanophenone

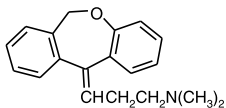


## Tricyclic Antidepressants

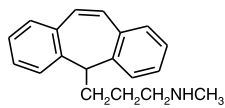


Dimensions: 3  $\mu$ m, 150 x 2.1mm  
 Part Number: 25003-152130  
 Mobile Phase: A: 0.1% formic acid  
 B: ACN + 0.1% formic acid  
 Gradient: 30 – 50% in 15 min  
 Flow: 0.2 mL/min  
 Temperature: 30°C  
 Detection: UV at 254 nm

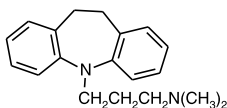
1. Doxepin



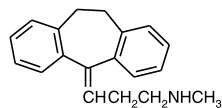
2. Protriptyline



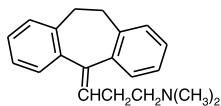
3. Imipramine



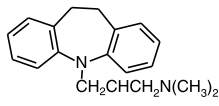
4. Nortriptyline



5. Amitriptyline



6. Trimipramine



## Hypersil GOLD Columns




DESCRIPTION	LENGTH (mm)	4.6 mm ID	3.0 mm ID	2.1 mm ID	10 mm ID	21.2 mm ID
<b>3 µm Hypersil GOLD</b>	30	25003-034630	25003-033030	25003-032130	–	–
	50	25003-054630	25003-053030	25003-052130	–	–
	100	25003-104630	25003-103030	25003-102130	–	–
	150	25003-154630	25003-153030	25003-152130	–	–
<b>5 µm Hypersil GOLD</b>	30	25005-034630	25005-033030	25005-032130	–	–
	50	25005-054630	25005-053030	25005-052130	25005-059070	25005-059270
	100	25005-104630	25005-103030	25005-102130	25005-109070	25005-109270
	150	25005-154630	25005-153030	25005-152130	25005-159070	25005-159270
	250	25005-254630	25005-253030	25005-252130	25005-259070	25005-259270
<b>8 µm Hypersil GOLD</b>	150	25008-154630	–	–	25008-159070	25008-159270
	250	25008-254630	–	–	25008-259070	25008-259270

Other column dimensions are also available. Please call Customer Service for more information.

## Hypersil GOLD Drop-In Guard Cartridges (pk/4)



DESCRIPTION	LENGTH (mm)	4.6 mm ID	3.0 mm ID	2.1 mm ID
3 µm Hypersil GOLD	10	25003-014001	25003-013001	25003-012101
5 µm Hypersil GOLD	10	25005-014001	25005-013001	25005-012101
8 µm Hypersil GOLD	10	25008-014001	–	–
UNIGUARD Direct-Connect Drop-in Guard Cartridge Holder		850-00	852-00	852-00

## Other Hardware Designs for Hypersil GOLD Columns

PIONEER™ Columns		Direct connection columns
KAPPA™ Columns		Highly efficient capillary columns
Javelin Express™		Economical, non-tested analytical columns
DASH™ Columns		Short, fast columns for high throughput analyses
Javelin™ Guard Columns		Direct connection column protection
Preparative Columns		Available in 10, 21.2, 30, 40, 50 and 100 mm ID

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