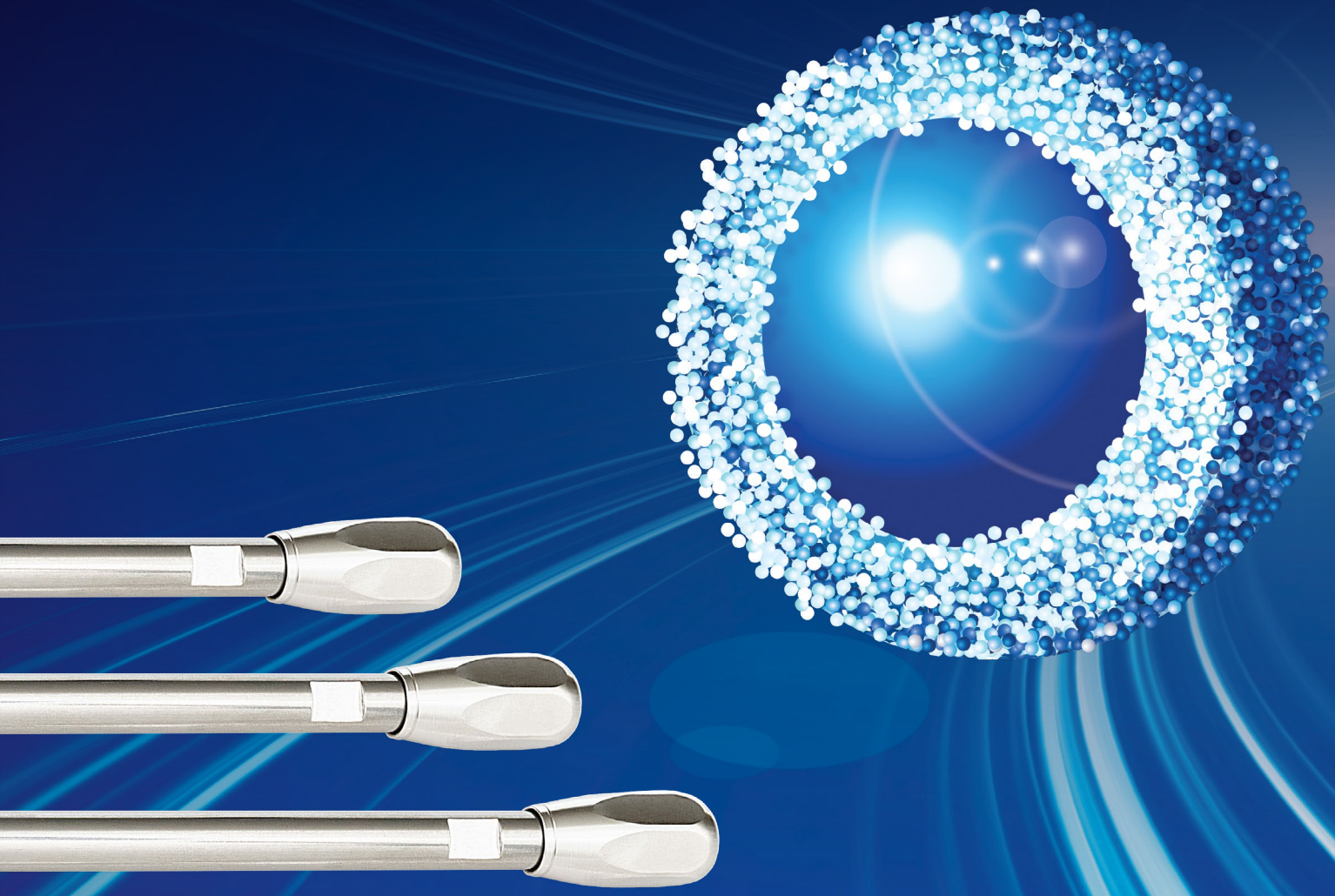
HALO®

HPLC分离的更优路径



advancedmaterialstechnology

HALO®

发现FUSED-CORE®色谱柱的优势

2017
HALO 1000 Å Protein
第一个1000 Å孔径的核壳型色谱柱，
用于大蛋白混合物的高效分离。

2013
HALO BIOCLASS产品介绍
Protein, Peptide and Glycan solutions for biomolecule separations

2006
独创的 HALO 2.7µm核壳型，
改变了人们对高效分离所需条件的认知。

2005
AMT成立
Wilmington DE, USA

INNOVATION YOU CAN TRUST...

持续不断的创新

我们坚持使命，开辟更优的色谱分离之路。

2024

创新的表面改性颗粒 - ELEVATE, PCS

多种新的化学键合相，可以在极低至极高的 pH 条件下保持稳定，以及表面带电技术。

2022

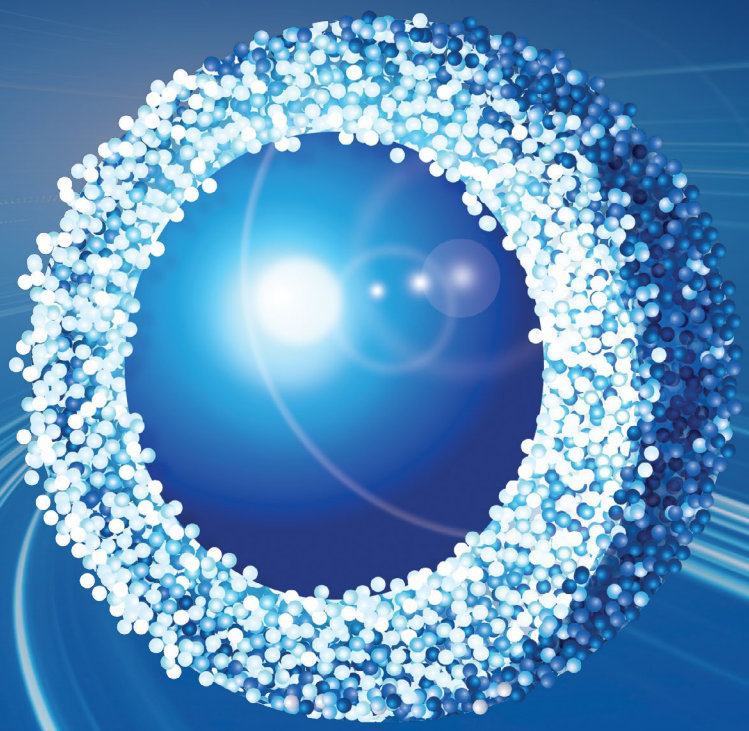
HALO® 1.5 MM 内径色谱柱

与 2.1 mm 内径相比，节省50%溶剂消耗，信号强度达到 2 倍。

2020

HALO® ENVIROCLASS

PAH 和 PFAS 分离的解决方案

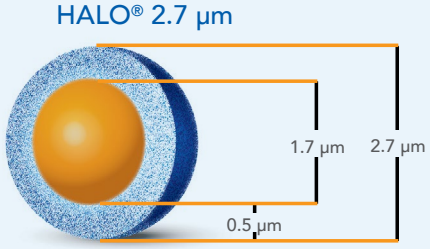


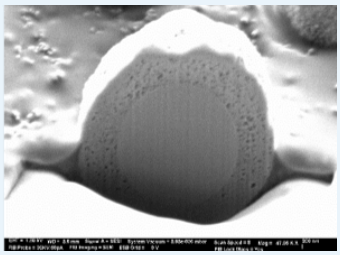
PERFORMANCE YOU CAN RELY ON

HALO® –HPLC分离的更优路径

为应对生产效率提升的需求，色谱工作者在不断推动分离的极限。我怎么才能在更短的时间内获得更好的分离，或者更少的溶剂消耗，或者更高的灵敏度，或者前面几个都能达到？不同操作者可能要求不同，但总目标一样："我需要更多，但不能牺牲任何东西"。这种困境一直存在，所以21世纪初UHPLC仪器首次出现时，就引起了人们极大的关注。分离科学家们提出了一种可能性，通过采用更小颗粒的色谱柱和能够耐受这些色谱柱所产生的高背压的新仪器，可以减少高达70%的运行时间，而且仍然保持高分离度。

2005年，Advanced Materials Technology通过不同的路径达到这一目标，发布了一项新的技术–核壳型颗粒。该颗粒是在实心核外包裹一层多孔壳层，可以提供高效的分离而不会产生更高的背压。HALO® Fused-Core® 核壳型颗粒开启了一次伟大的技术革新，该技术被公认为HPLC和LCMS分离的新标准！





FIB - SEM image of first commercial HALO® particle with 2.7 µm total size consisting of a 1.7 µm solid silica core and a 0.5 µm shell.

TESTIMONIALS TELL THE STORY...

"THE PARTICLE LETS YOU DO "UHPLC-LIKE" SEPARATIONS ON A STANDARD SYSTEM OR DO ULTRAFAST HPLC ON A UHPLC SYSTEM" - CUSTOMER COMMENT

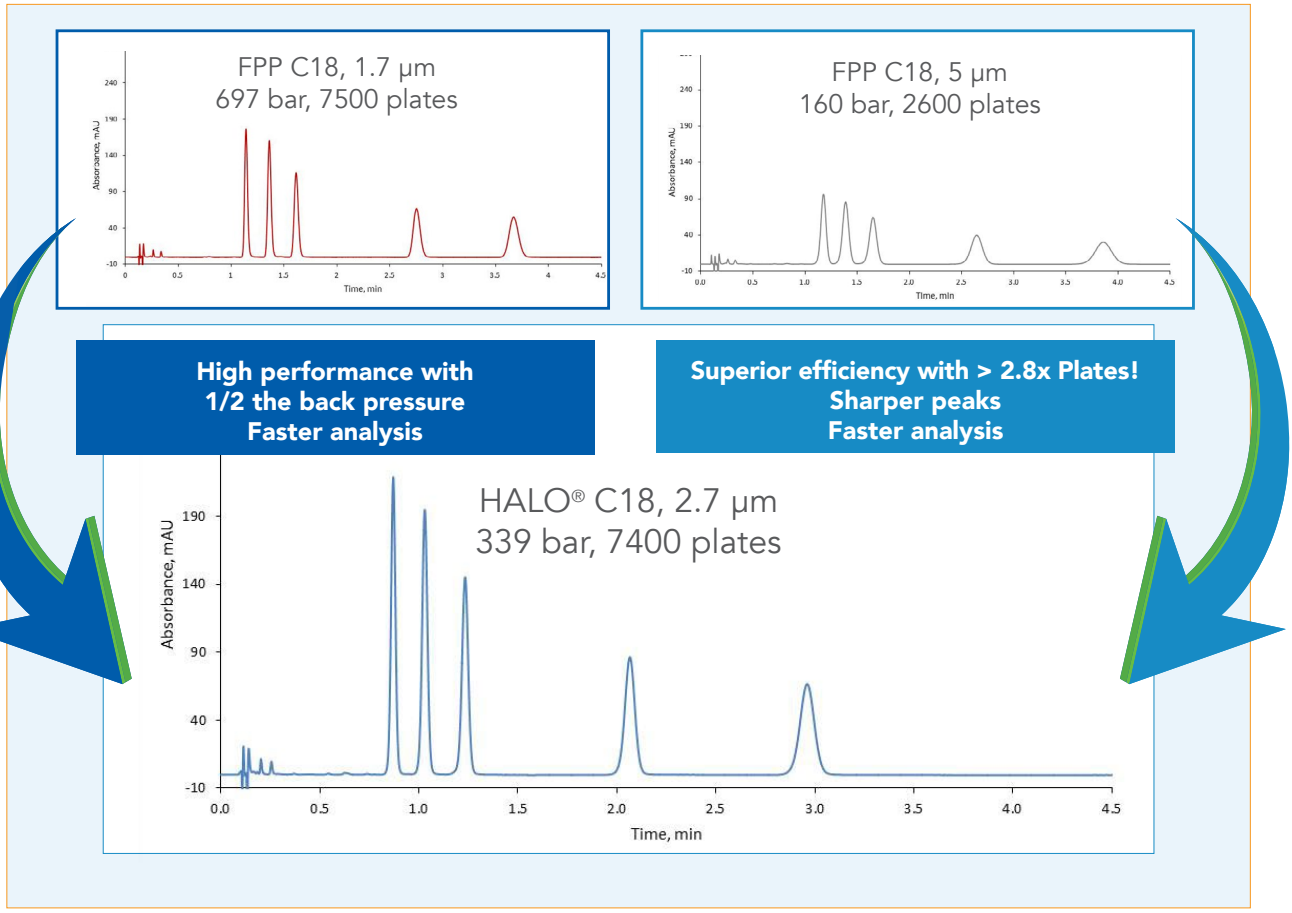
"In a previous position as Team Head of an analytical R&D group at a major pharmaceutical company, our team found HALO® columns to be a very effective tool in small molecule method development. Our development chemists found that superficially porous HALO® columns offer "UHPLC" like performance while maintaining the ability to run on conventional, reliable HPLC equipment. This attribute is especially important where methods are developed at one site and then transferred to global QC sites or third-party labs. " - R&D Scientist, Pharmaceutical

"The 2µm HALO® C18, 3x30 mm routinely lasts for 20,000 injections! Running 200 samples per day for 5 months average" - Chemical Analysis Group at Global CRO"

技术概述

HALO® Delivers Higher Efficiency

独创性的HALO® Fused-Core® 核壳型色谱柱的性能比全孔型亚2μm更具竞争力，且显著优于3μm和5μm常规全孔型色谱柱，真正实现了提升性能但不产生超高柱压的目标!



准备好将您的 FPP 方法转换成 Fused-Core® 了吗?

方法转换指南

适用于小分子分析的 HALO® 色谱柱

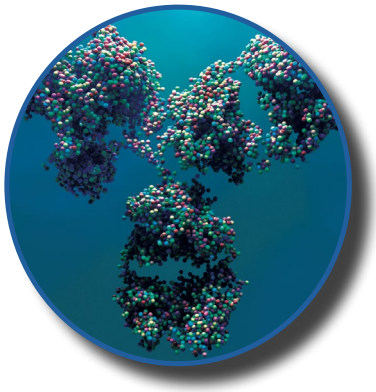
小分子分离的HALO® (U)HPLC/LCMS色谱柱是为分离含有少量成分的简单化合物到含有数百种成分的复杂化合物而设计。用于小分子分离的HALO®色谱柱孔径为90Å，有不同键合相、颗粒大小以及不同规格可供选择，以适应从半制备到LCMS系统。

HALO® ENVIROCLASS 色谱柱是专为分离全氟和多氟烷基物质(PFAS)以及多环芳烃(PAH)而设计。此外，该产品线还针对其他持久性、环境影响大、产生污染的药物（例如杀虫剂、霉菌毒素、除草剂等）提供了一整套解决方案，所有这些都基于创新的、值得信赖的HALO®核壳型颗粒技术，并考虑了环境实验室的独特需求。

使用FUSED-CORE® 小分子分析色谱柱发现更多：

- 针对小分子化合物优化了的90Å孔径
- 有2µm, 2.7µm和5µm粒径可供选择
- 满足反相或者HILIC模式所需的多种键合相
- 有PFAS, PFAS延迟柱和PAH专用色谱柱
- 从毛细柱到半制备等不同规格可供选择

适用于生物样品分析的HALO®色谱柱

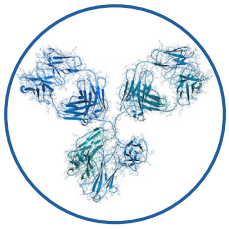


HALO® BioClass 色谱柱经过专门设计，可通过简单、高效的解决方案实现生物样品分离的目标。孔隙形态和键合相经过优化，以促进生物分子的快速和高效分离，从而支持新药研发中新型治疗蛋白、寡核苷酸和多肽的开发，表征蛋白翻译后修饰，并充分评估生物类似药与其他生物工程和制造产品的细微差异。

从设计用于完整蛋白和单克隆抗体(mAbs)分析的创新型1000Å孔径材料，到高效的LCMS多肽色谱柱和用于寡核苷酸分离的OLIGO色谱柱，以及用于聚糖分离的GLYCAN色谱柱，HALO®为生物工作提供了一整套量身定制的解决方案。

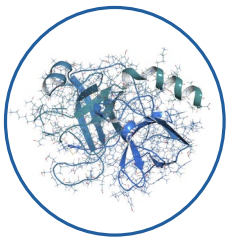
使用BIOCLASS色谱柱发现更多：

蛋白



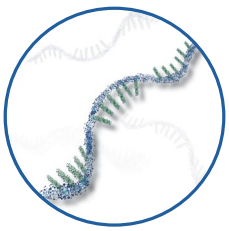
- 大孔径(1000Å和400Å)的设计，确保了即便是分子量很大的蛋白质也能够不受限制地与所有键合相分子相互作用，从而获得良好的峰形和回收率。
- 能够满足UHPLC、HPLC及质谱分析所需的多种键合相
- 多种键合相提供量身定做的解决方案
- 专为快速、高效分离而设计的颗粒形态

多肽



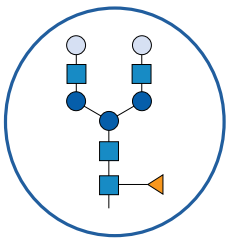
- 专有的160Å核壳型填料技术确保了快速、高效的肽分离
- 出色的峰容量确保了无论是在UHPLC,HPLC还是在LC-MS上均能得到稳定可靠的分析结果
- 广泛的粒径与键合相组合方便了不同的分析需求

寡核苷酸



- 120Å孔径，能够分离长达60个碱基的寡核苷酸
- 高pH值和高温条件下出色的稳定性，专为分离寡核苷酸而设计
- UHPLC和质谱兼容的键合相
- 使用表面惰性的硬件，降低可能发生在钢管上的样品吸附。

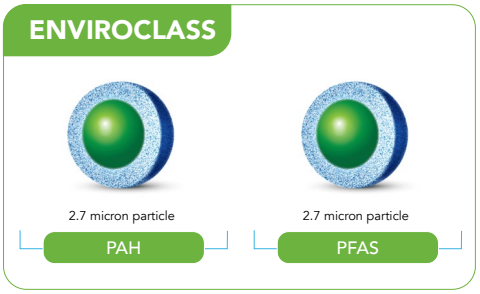
聚糖

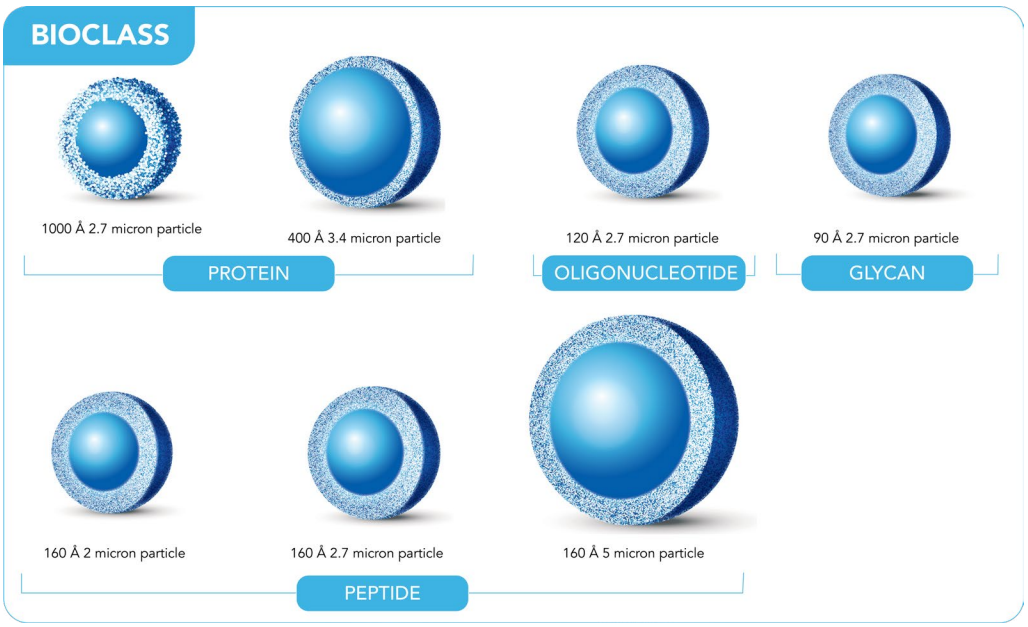


- 用于聚糖分析的色谱柱
- 酸性和两性离子分析物的保留时间得以改善
- 受缓冲盐浓度的影响较小
- 能够分离通过不同方式结合形成的寡糖异构体

HALO® 产品家族

HALO®产品家族由一系列不同颗粒组成，这些颗粒通过不同的实心核大小、壳层厚度以及孔径来满足分离需求。广泛的键合相也为小分子和大分子方法开发提供了多种选择性。





HALO® PARTICLE SIZES AND PROPERTIES

	2 µm	2.7 µm	5 µm
Best Uses	complex separations when ultimate resolution is required with a low system volume UHPLC	best all-purpose rugged particle providing high efficiencies with minimal back pressure	when more performance or lower back pressures from 3 µm or 5 µm FPP methods are desired; samples with dirty matrices
Performance Potential (plates/meter)	300,000+	230,000+	160,000+
Efficiency Comparison to FPP	outperforms <2 µm FPP	performance of <2 µm FPP	performance of 3 µm FPP
Instrumentation	UHPLC/MS	UHPLC/HPLC/MS	HPLC

HALO®

细分市场

药品

生物制品

维生素

环境

食品饮料

临床/毒理学

大麻

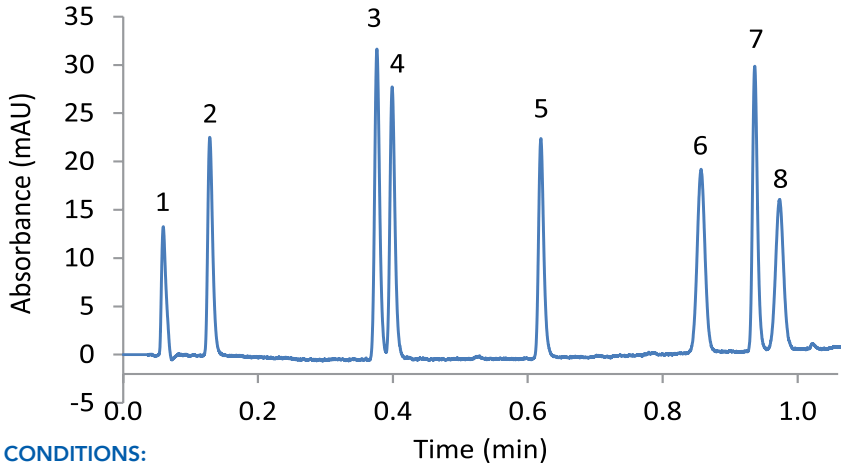
工业

药品应用

为了确保药物和治疗方法能够安全有效地治病救人，在严格的检测制度中，制药科学要求产品的重现性、准确性和质量。HALO®色谱柱是在我们ISO 9001:2015质量管理体系认证的设施中制造的，我们从原材料开始，对每一个加工步骤进行质量控制，以确保可信赖的批间重现性。

使用HALO 90 Å C18, 2 µM色谱柱分离抗凝剂

抗凝剂用于减缓和防止凝血，本例中，使用HALO 90 Å C18, 2.0 µm色谱柱可以在1min之内分离7种不同的抗凝剂。



PEAK IDENTITIES:

1. Uracil (t_0)
2. 6,7-Dihydroxycoumarin
3. 4-Hydroxycoumarin
4. Coumarin
5. 6-Chloro-4-hydroxycoumarin
6. Warfarin
7. Coumatetralyl
8. Coumachlor

TEST CONDITIONS:

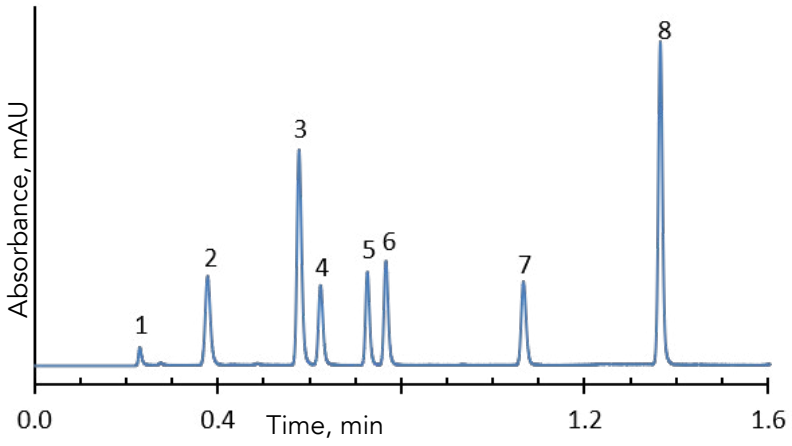
Column: HALO 90 Å C18, 2.0 µm, 2.1 x 30 mm
Part Number: 91812-302
Mobile Phase:
A: 0.02 M formic acid
B: 50/50 acetonitrile/methanol

Gradient:
Hold at 20% B until 0.06 min
20-75% B from 0.06-1.06 min
Flow Rate: 1.1 mL/min
Pressure: 430 bar
Temperature: 45 °C

Detection: UV 254 nm, PDA
Injection Volume: 0.2 µL
Acquisition Rate: 200 Hz
Flow Cell: 1.0 µL
LC System: Shimadzu Nexera X2

HALO® RP-AMIDE色谱柱超快速分离抗生素和抗真菌药物

抗菌药氯法齐明和其他抗真菌药物可以使用低背压的HALO® RP-Amide色谱柱在1.5分钟内分离，这证明了Fused-Core®技术的强大性能。



TEST CONDITIONS:

Column: HALO 90 Å RP-Amide, 2.7 µm, 4.6 x 50 mm
Part Number: 92814-407
Mobile Phase:
A: 0.02 M phosphate buffer, pH 3.0
B: Acetonitrile

Gradient:

Time (min)	%B
0.0	41
1.0	80
1.6	80

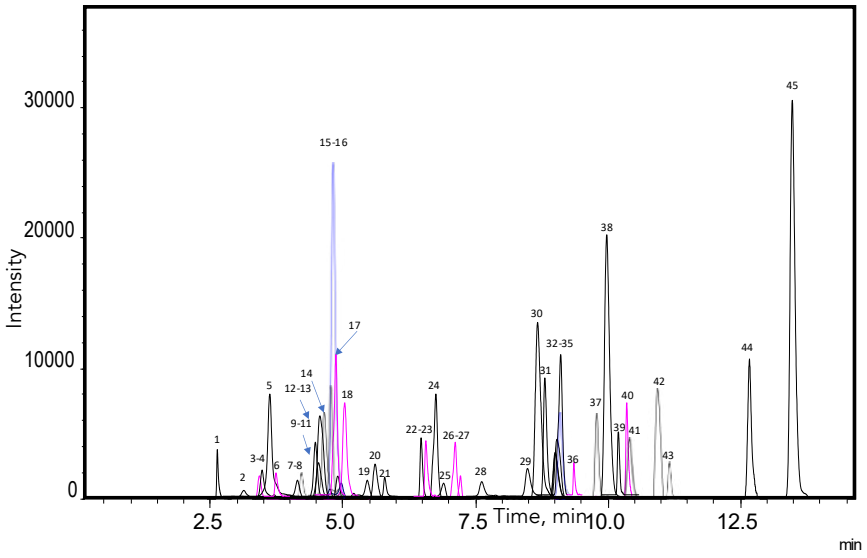
Flow Rate: 2.0 mL/min
Initial Pressure: 188 bar
Temperature: 35 °C
Detection: UV 230 nm, VWD
Injection Volume: 0.3 µL
Sample Solvent: 25/75 water/acetonitrile
Response Time: 0.02 sec
Flow Cell: 2.5 µL semi-micro
LC System: Shimadzu Prominence UFLC XR

PEAK IDENTITIES:

1. Unknown
2. Ketoconazole
3. Naftifine
4. Clotrimazole
5. Econazole
6. Sulconazole
7. Clofazimine
8. Tolnaftate

HALO® C18色谱柱LCMS高效分离兽药

检测食品中的兽药残留对于预防可能发生的过敏反应、细菌耐药性和意外中毒都非常重要。使用HALO® C18可以快速分离复杂的兽药混合物，从而实现高通量分析。



PEAK IDENTITIES:

1. Ciprofloxacin
2. Sulfathiazole
3. Lincomycin
4. Sulfapyridine
5. Albendazole-2-amino
6. Trimethoprim
7. Ormetoprim
8. Tetracycline
9. Enrofloxacin
10. Danofloxacin
11. Sulfaclozine
12. Sulfachloropyridazine
13. Sulfamerazine
14. Diclofenac
15. Difloxacin
16. Amoxicillin
17. Chlortetracycline
18. Sulfadoxine
19. Sulfaethoxypyridazine
20. Penicillin G
21. Neospiramycin
22. Spiramycin
23. Sulfadimethoxine
24. Albendazole Sulfoxide
25. Albendazole Sulfone
26. Sulfaquinoxaline
27. Phenylbutazone
28. Tilmicosin
29. Flumequin
30. Nalidixic Acid
31. Oxolinic Acid
32. Kitasamycin
33. Tylosin
34. Florfenicol Amine
35. Erythromycin A
36. Malachite Green
37. Albendazole
38. Cloxacillin
39. Dicloxacillin
40. Leucocrystal Violet
41. Crystal Violet
42. Brilliant Green
43. Dapsone
44. Carprofen
45. Ivermectin

TEST CONDITIONS:

Column: HALO 90 Å C18, 2.7 µm, 2.1 x 100 mm
Part Number: 92812-602
Mobile Phase A: Water, 0.1 % Formic Acid

Mobile Phase B: ACN, 0.1% Formic Acid
Flow Rate: 0.4 mL/min
Pressure: 228 bar
Temperature: 35 °C

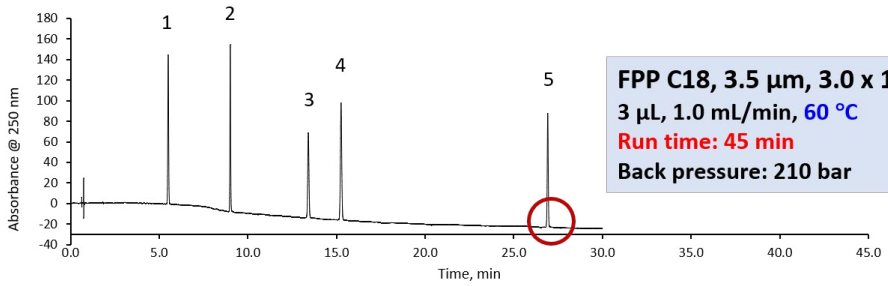
Injection Volume: 2.0 µL
Sample Solvent: 50/50/ MEOH/H_2O
Detection: +ESI MS/MS
LC System: Shimadzu Nexera X2
ESI LCMS System: Shimadzu

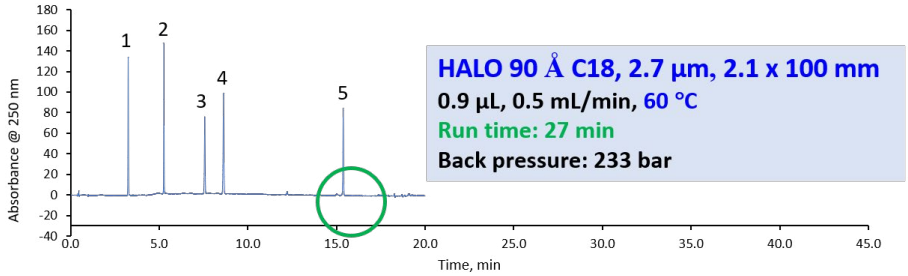
LCMS-8040
Gradient: 3-36% B in 5 min, 36-100% B in 0.5 min, hold at 100% B for 1 min, 100-3% B in 0.5 min, hold at 3% B for 4 min

MS Source Conditions:
ESI +
Spray Voltage: 3.0 kV
Nebulizing gas: 2 L/min
Drying gas: 15 L/min
DL temp: 250 °C
Heat Block: 400 °C

使用USP原方法分离利伐沙班，HALO® 的分析速度提高了40%。

使用HALO® C18，样品洗脱时间能缩短40%，从而节省溶剂和样品的使用量。使用HALO® Fused-Core® 技术，利伐沙班的原始方法可以得到优化，从而缩短分析时间、节省溶剂和样品使用量，并符合USP指导原则的要求。





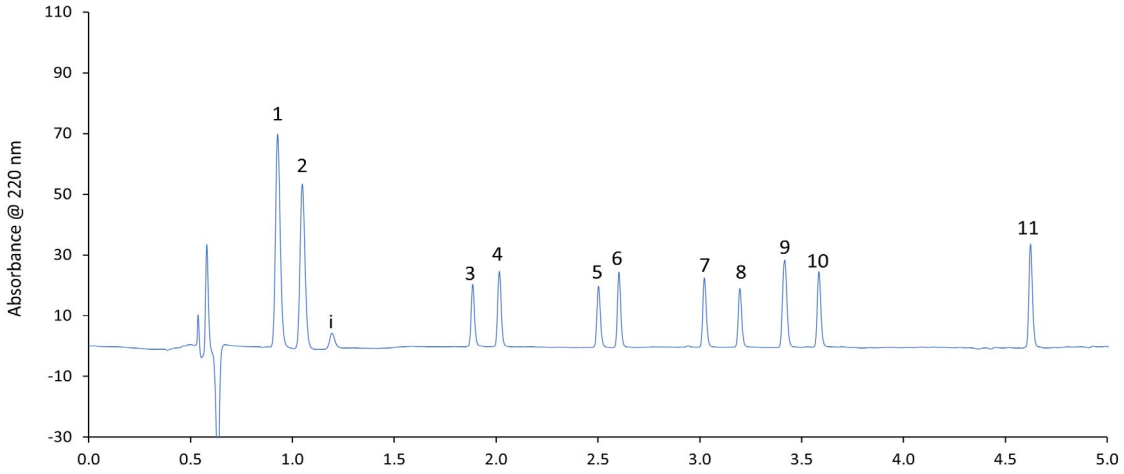
PEAK IDENTITIES:

1. Rivaroxaban related compound B
2. Rivaroxaban related compound D
3. Rivaroxaban related compound G
4. Rivaroxaban
5. Rivaroxaban related compound J

* to view the complete test conditions, visit halocolumns.com

HALO® PCS C18色谱柱快速分离β受体阻断剂

使用HALO® 表面带正电的色谱柱在UV和MS兼容的条件下，5分钟内分离11种不同的β受体阻断剂。



PEAK IDENTITIES:

1. Sotalol
2. Atenolol
3. Pindolol
4. Nadolol
5. Metoprolol
6. Acebutolol
7. Oxprenolol
8. Bisoprolol
9. Labetalol
10. Propranolol
11. Carvedilol

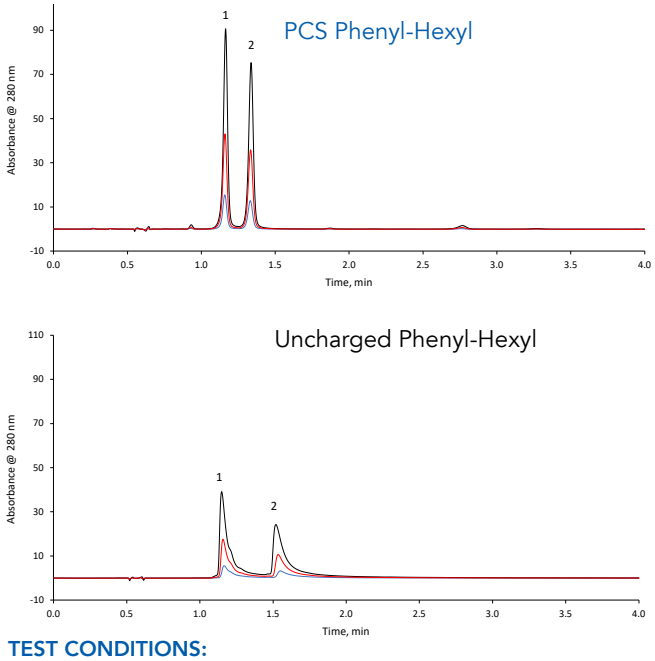
i = impurity in bisoprolol

TEST CONDITIONS:

Column: HALO 90 Å PCS C18, 2.7 µm, 2.1 x 100 mm
Part Number: 92812-617
Mobile Phase: A: Water, 0.1% Formic Acid
B: Acetonitrile, 0.1% Formic Acid
Gradient Separation:
3-36% B in 5 min, 36-100% B in 0.5 min, hold at 100% B for 1 min, 100-3% B in 0.5 min, hold at 3% B for 4 min
Flow Rate: 0.4 mL/min
Back Pressure: 281 bar
Temperature: 30 ℃
Injection: 1.0 µL
Sample Solvent: 93/7 Water/ACN
Wavelength: PDA, 220 nm
Flow Cell: 1 µL
Data Rate: 100 Hz
Response Time: 0.025 sec.
LC System: Shimadzu Nexera X2

正电对碱性化合物的影响

在这个四环素的案例中，比较了表面带正电和非表面带电的苯基-己基键合相，HALO® PCS Phenyl-Hexyl色谱柱对于碱性化合物的载样量更高。基于峰型的显著改善，使得杂质更容易被检出。



TEST CONDITIONS:

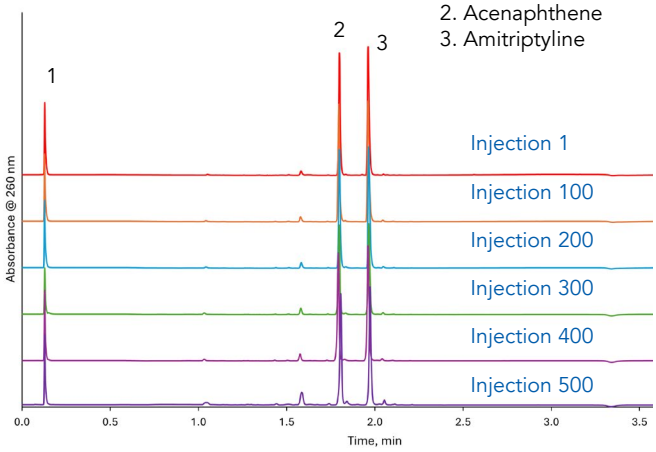
Column: 2.7 µm, 2.1 x 100 mm phase as labeled
Mobile Phase A: Water/ 0.1% Formic Acid
B: Acetonitrile/ 0.1% Formic Acid
Isocratic: 12% B HALO® PCS Phenyl-Hexyl
18% B HALO® Phenyl-Hexyl
Flow Rate: 0.4 mL/min
Injection: 0.2, 0.5, 1.0 µL (10,25,50 ng)
Temperature: 35 ºC
Instrument: Nexera

HALO® ELEVATE C18色谱柱在高PH条件下的稳定性

使用HALO® Elevate C18色谱柱实现了三环类抗抑郁药（阿米替林）在高温/高pH条件下的稳定运行。 超过20000个柱体积后，保留时间变化低于1%。

PEAK IDENTITIES:

1. Uracil
2. Acenaphthene
3. Amitriptyline



TEST CONDITIONS:

Column: HALO 120 Å ELV C18, 2.7 µm, 2.1 x 50 mm
Part Number: 92272-402
Mobile Phase A: 95/5 10mM Ammonium Bicarbonate, pH:10/ Acetonitrile
Mobile Phase B: Acetonitrile
Gradient: 0-95% B in 2.5 min, hold at 95% B for 0.5 min, 95-0% B in 0.1 min, hold at 0% B for 1.9 min
Flow Rate: 0.8 mL/min
Back Pressure: 220 bar
Temperature: 60 °C
Detection: UV/PDA, 260 nm
Injection Volume: 1.0 µL
LC System: Shimadzu Nexera X2

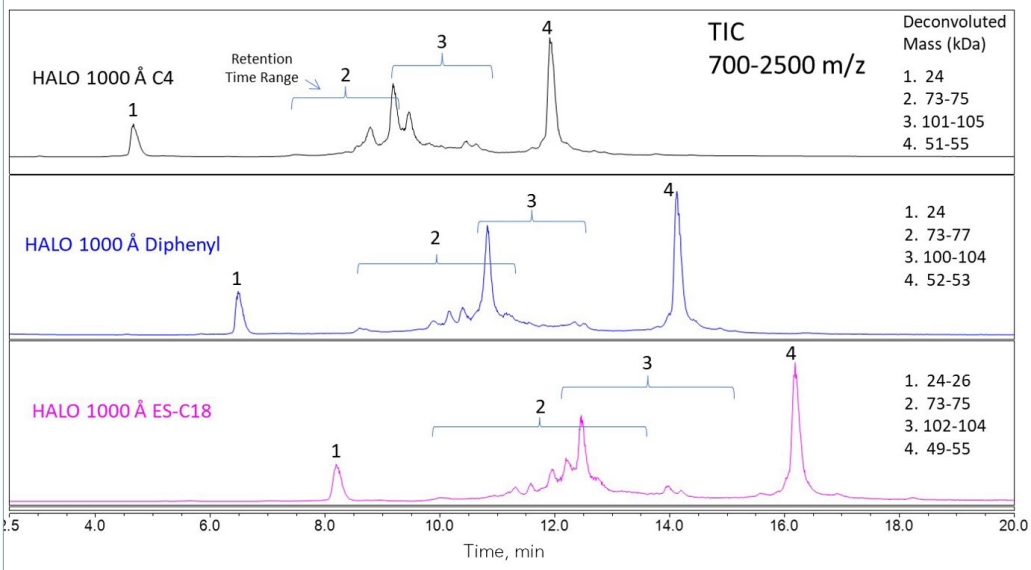
生物制品应用

在现代医药研究的最前沿，生物制剂正为更好的疗效开辟道路。为突破药物开发和设计的极限，生物制药须遵守一系列测试要求，其中色谱法是一个重要部分。

HALO® BIOCLASS 产品经过独特的颗粒形态设计，以满足这些需求。

HALO 1000 Å 键合相LC-MS分析ADC MIMIC

三种不同的HALO 1000 Å键合相为ADC Mimic的分析提供了不同选择性。



PEAK IDENTITIES:

MWs as labeled on the TICs

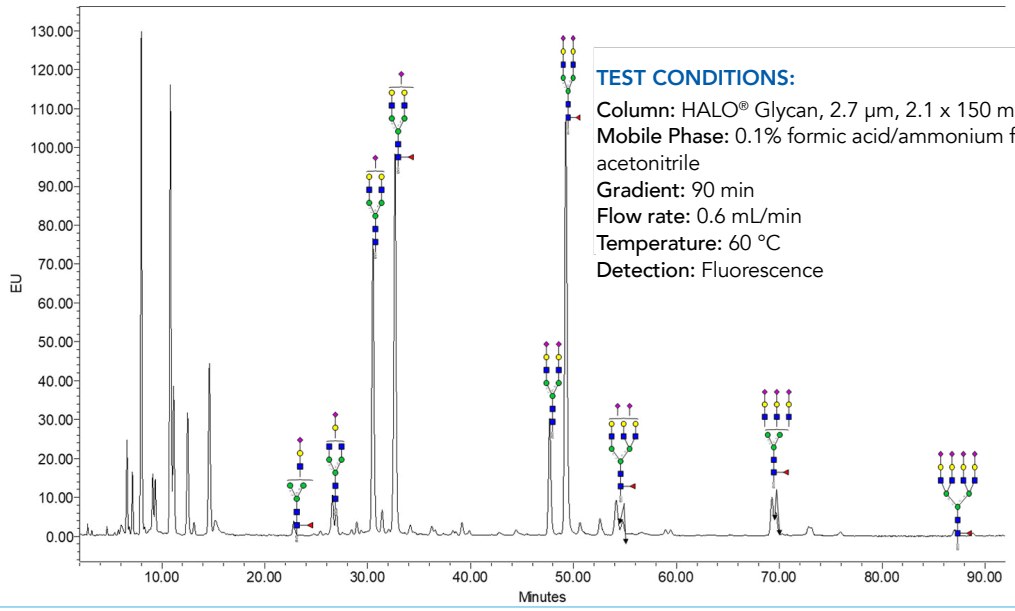
TEST CONDITIONS:

Column: HALO 1000 Å C4, 2.7 µm, 2.1 x 150 mm
Part Number: 92712-714
Column: HALO 1000 Å Diphenyl, 2.7 µm, 2.1 x 150 mm
Part Number: 92712-726
Columns: HALO 1000 Å ES-C18, 2.7 µm, 2.1 x 150 mm
Part Number: 92712-702
Mobile Phase A: Water/0.1% DFA
B: ACN/0.1% DFA
Gradient: 30-39 %B in 20 min
Flow Rate: 0.4 mL/min
Temperature: 75 °C
Detection: MS
Injection Volume: 5 µL
LC System: Shimadzu Nexera

MS Conditions:
Detection: + ESI MS/MS
ESI LCMS System: Velos Pro Orbitrap
Spray Voltage: 4 kV
Capillary Temperature: 275 °C
Source Heater: 300 °C
Sheath Gas: 35
Aux Gas: 10
RF lens: 70

HALO® GLYCAN色谱柱分离超过70种聚糖，峰容量接近200

使用HALO® Glycan色谱柱的HILIC模式，实现了对糖蛋白中聚糖的综合表征，并具有高峰容量。

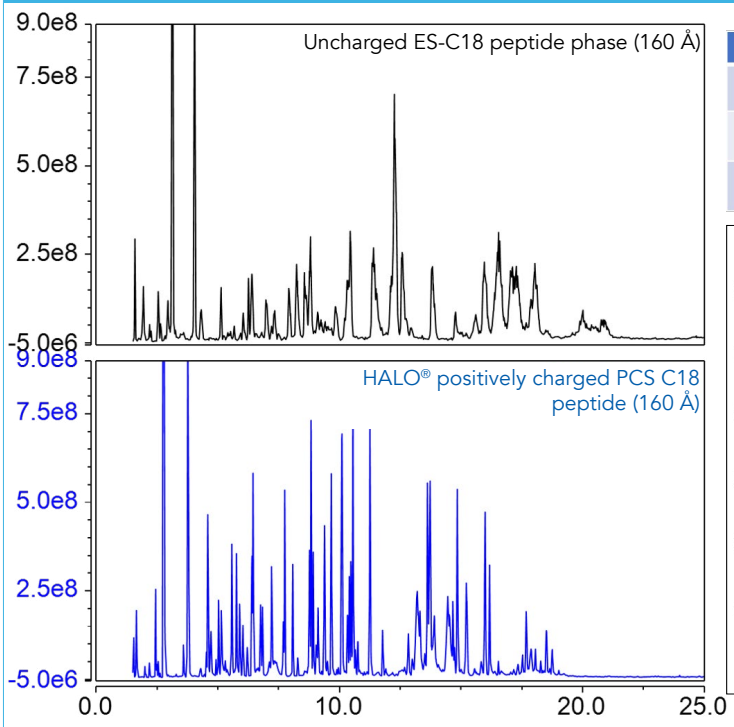


TEST CONDITIONS:

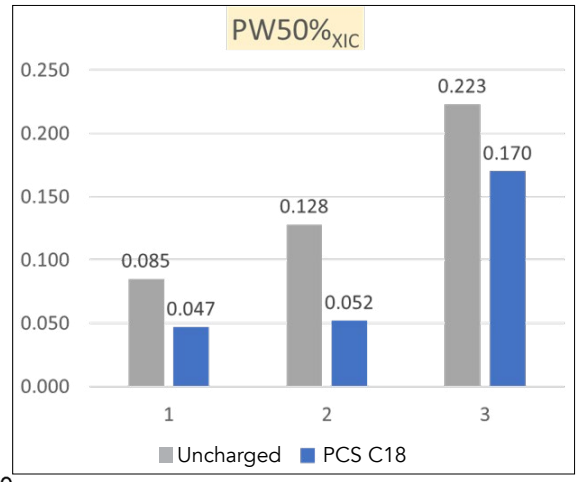
Column: HALO® Glycan, 2.7 µm, 2.1 x 150 mm
Mobile Phase: 0.1% formic acid/ammonium formate/ acetonitrile
Gradient: 90 min
Flow rate: 0.6 mL/min
Temperature: 60 °C
Detection: Fluorescence

HALO® PCS PEPTIDE色谱柱提高曲妥珠单抗胰蛋白酶消化物的峰容量

使用表面带正电的键合相(PCS Peptide),在低离子强度下分离多肽,可以获得独特的选择性和更好的分离。
通过测量3种多肽在50%峰高处的峰宽,可以看到HALO® PCS Peptide键合相是如何在低离子强度(如:甲酸)条件下显著提高多肽分离的。



#	Tryptic Peptide	XIC	$t_{R\ (min)}$
1	AEDTAVYYC(Carbamidomethyl)SR	667.7877 z=2	ES-C18: 6.41 PCS C18: 4.60
2	TPEVTC(Carbamidomethyl)VVVDVSHEDPEVK	713.6807 z=3	ES-C18: 12.28 PCS C18: 10.11
3	TVAAPSVFIFPPSDEQLK	973.5171 z=2	ES-C18: 17.12 PCS C18: 14.47



TEST CONDITIONS:

Column: HALO 160 Å ES-C18,2.7 µm, 2.1 x 150 mm
Part Number: 92122-702
Column: HALO 160 Å PCS-C18,2.7 µm, 2.1 x 150 mm
Part Number: 92112-717
Mobile Phase A: Water + 0.1% Formic Acid
Mobile Phase B: Acetonitrile + 0.1% Formic Acid

Gradient:

Time	%B
0.0	3
30.0	50
30.1	95
33.0	95
33.1	3
37.0	3

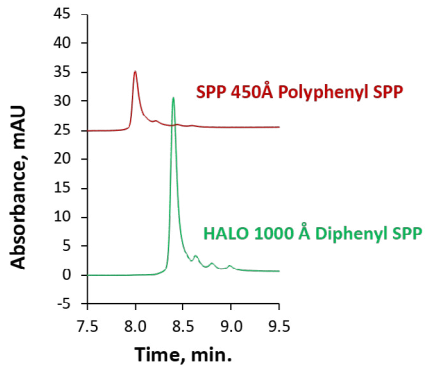
Flow Rate: 0.4 mL/min
Pressure: 465 bar
Temperature: 60 °C
Injection Volume: 1 µL
Sample: Trastuzumab Tryptic Digest (1.25 µg/µL)
Sample Solvent: Refer to Digestion Procedure
LC System: Shimadzu Nexera X2

MS CONDITIONS:

System: QExactive HF
ESI positive polarity
300-2000 m/z
Source voltage: 3.2kV
Sheath Gas: 40
Aux Gas: 20
Aus Gas Temp: 275°C
Capillary Temp: 320°C
µscans: 1
Max Injection Time: 200 msec
S-Lens RF: 50

HALO 1000 Å DIPHENYL在低温条件下的性能

HALO 1000 Å Diphenyl色谱柱在低温条件下改善了分离、保留和峰面积。

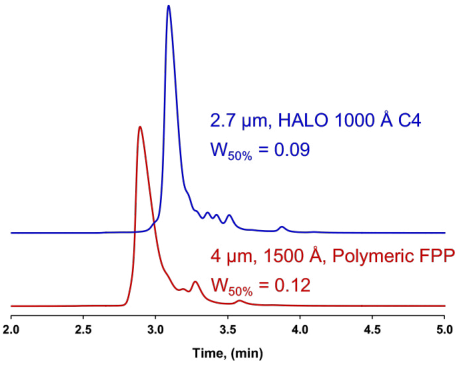


TEST CONDITIONS:

Columns: 2.1 x 150 mm; Flow rate: 0.4 mL/min; Mobile Phase A: water/0.1% TFA; Mobile Phase B: ACN/0.1% TFA; Gradient: 30-45% B in 15 min; Injection Volume: 2 µL of 2 mg/mL trastuzumab in water/0.1% TFA; Temp: 40 °C; Detection: PDA at 280 nm

与某大孔径色谱柱相比,HALO 1000 Å C4的峰形更尖锐

与1500 Å FPP相比,HALO 1000 Å对完整曲妥珠单抗的分离更佳。

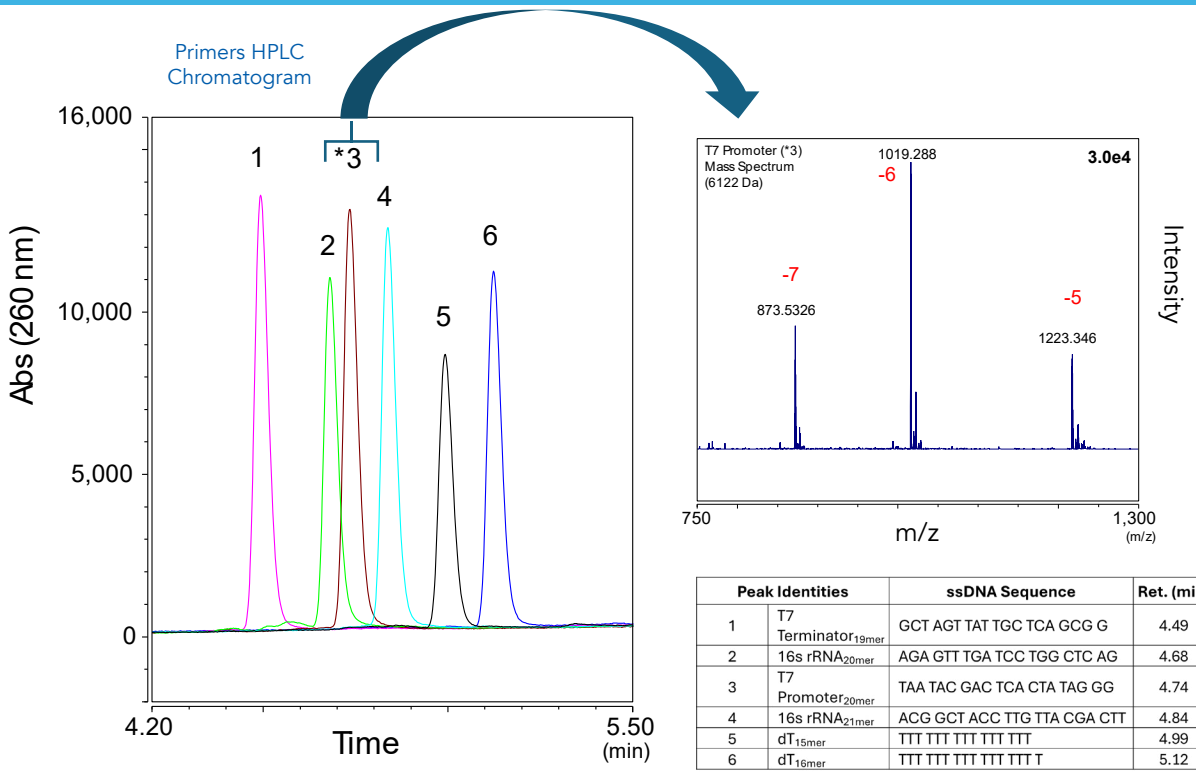


TEST CONDITIONS:

Conditions: Columns: 2.1 x 100 mm; Mobile phase A: water (0.1% TFA); Mobile phase B: 80/20 ACN/water (0.085% TFA); Gradient: 40–47.5% B in 8 min; Flow rate: 0.4 mL/min; Temperature: 80 °C; Sample: trastuzumab; Injection volume: 2 µL of 2 mg/mL in water; Instrument: Shimadzu Nexera; Detection: UV at 280 nm with 350 nm reference wavelength

LC/MS分离寡核苷酸N-1

HALO® OLIGO C18色谱柱分离6种不同的寡核苷酸。在缓梯度条件下，这些寡核苷酸可以完全分离，这显示了OLIGO C18色谱柱的实用性。碱基在低聚物的分离中起着重要作用。使用HALO® OLIGO C18色谱柱，即使碱基种类或长度发生微小变化，也可以分离出来。



Peak Identities		ssDNA Sequence	Ret. (min)	T_m (°C)
1	T7 Terminator$_{19mer}$	GCT AGT TAT TGC TCA GCG G	4.49	60.3
2	16s rRNA$_{20mer}$	AGA GTT TGA TCC TGG CTC AG	4.68	61.3
3	T7 Promoter$_{20mer}$	TAA TAC GAC TCA CTA TAG GG	4.74	55.2
4	16s rRNA$_{21mer}$	ACG GCT ACC TTG TTA CGA CTT	4.84	63.5
5	dT$_{15mer}$	TTT TTT TTT TTT TTT	4.99	38.6
6	dT$_{16mer}$	TTT TTT TTT TTT TTT T	5.12	40.9

TEST CONDITIONS:

Column: HALO 120 Å OLIGO C18, 2.7 µm, 2.1 x 50 mm
Mobile Phase: A: 5mM TEA/50mM HFIP, pH 8.35
B: Methanol
Gradient: Time %B
0.0 5
7.0 18

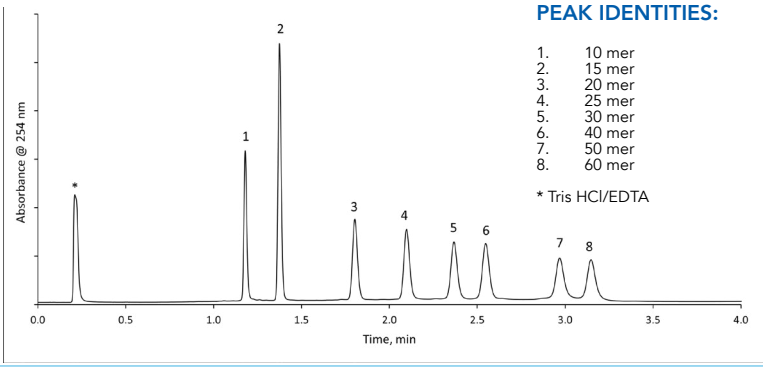
Flow Rate: 0.4 mL/min
Back Pressure: 106 bar
Temperature: 50 °C
Injection: 1.0 µL, 10ng on-column
Sample Solvent: 10mM Tris HCl/1mM EDTA pH=8.0
Wavelength: PDA, 260 nm

Flow Cell: 1 µL
Data Rate: 100 Hz
Response Time: 0.025 sec.LC System: Shimadzu Nexera X2
MS System: Thermo Velos Pro Orbitrap

MS CONDITIONS:
Detection: (-) HESI
Spray Voltage: 2.5 kV
Capillary temp: 350°C
Source Heater temp: 300°C

HALO® OLIGO C18 & UV分离寡核苷酸混合物

本例使用醋酸三乙胺（TEAA）/紫外检测器，HALO® OLIGO C18在5分钟内分离10-60个碱基的混合物，展示出了优异的分离度和峰形。



PEAK IDENTITIES:

1. 10 mer
2. 15 mer
3. 20 mer
4. 25 mer
5. 30 mer
6. 40 mer
7. 50 mer
8. 60 mer

* Tris HCl/EDTA

TEST CONDITIONS:

Column: HALO 120 Å OLIGO C18, 2.7 µm, 2.1 x 50 mm
Part Number: P2A62-402
Mobile Phase: A: 100mM TEAA, pH 8.5
B: Acetonitrile
Gradient:
Time %B
0.0 5
0.5 7.4
3.5 10.7
3.6 20
4.1 20
4.2 5
9.0 5

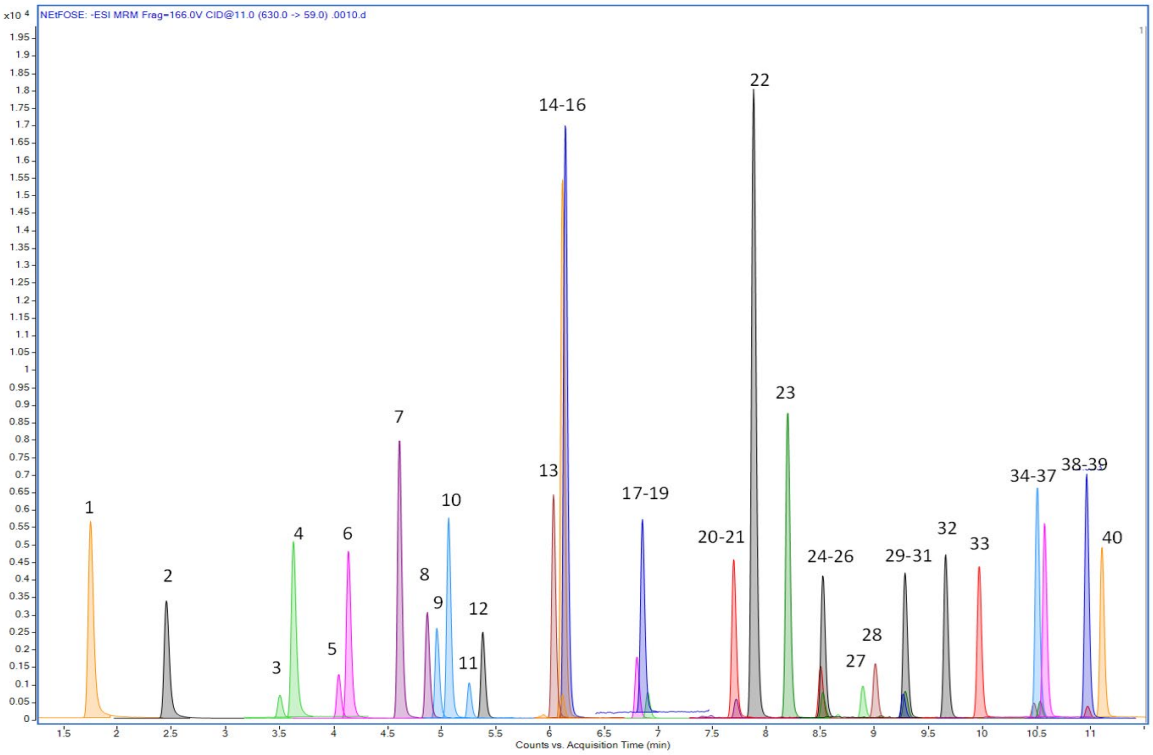
Flow Rate: 0.5 mL/min
Back Pressure: 137 bar
Temperature: 60 °C
Injection: 2.0 µL, (10µg)
Sample Solvent: 10mM Tris HCl/1mM EDTA pH=8.0
Wavelength: PDA, 254 nm
Flow Cell: 1 µL
Data Rate: 100 Hz
Response Time: 0.025 sec.
LC System: Shimadzu Nexera X2

环境分析应用

地球是人类赖以生存的家园，保护地球上的有限资源迫在眉睫。值得庆幸的是我们的环境科学家们已经开始直面这些挑战。他们根据已颁布的规定及即将出现的新情况，建立了一系列能够处理错综复杂情况的、持久可靠的色谱解决方案。HALO® EnviroClass解决方案由用于分离PFAS和PAH及其他小分子化学物质的应用组成，以解决环境样品的色谱分析问题。

采用EPA 1633方法快速分析PFAS

2021年，EPA颁布了1633方法用于检测各种基质中的40种PFAS物质，包括水、固体物质、生物固体及组织样本。
以下是使用EPA 1633方法对PFAS进行分析的HALO® PFAS解决方案，所有成分均在12分钟之内洗脱，成为一个快速分析。



PEAK IDENTITIES:

1. PFBA
2. PFMPA
3. 3-3 FTCA
4. PFPeA
5. PFBS
6. PFMBA
7. PFEESA
8. NFDHA
9. 4-2FTS
10. PFHxA
11. PFPeS
12. HFPO-DA
13. PFHpA
14. PFHxS
15. 5-3 FTCA
16. ADONA
17. 6-2FTS
18. PFOA
19. PFHpS
20. PFNA
21. PFOS
22. 7-3 FTCA
23. 9Cl-PF3ONS
24. 8-2FTS
25. PFDA
26. PFNS
27. NMeFOSAA
28. PFOSA
29. PFDS
30. PFUnA
31. NEtFOSAA
32. 11Cl-PF3OUdS
33. PFDoA
34. NMeFOSA
35. NMeFOSE
36. PFDoS
37. PFTrA
38. NEtFOSE
39. NEtFOSA
40. PFTeDA

TEST CONDITIONS:

Analytical Column: HALO® PFAS, 2.7 µm, 2.1 x 100 mm
Part Number: 92812-613
Delay Column: HALO® PFAS Delay, 2.7 µm, 3.0 x 50 mm
Part Number: 92113-415
Mobile Phase A: 20 mM Ammonium Acetate
Mobile Phase B: Methanol
Gradient:

Time	%B
0.0	20
12	90
15	90
15.1	20
18	End

Flow Rate: 0.4 mL/min
Pressure: 505 bar
Temperature: 44 °C
Detection: -ESI MS/MS
Injection Volume: 2.0 µL
Sample Solvent: Methanol (96%) Water (4%)
MS System: Agilent 6400 series
LC System: Agilent 1200 series

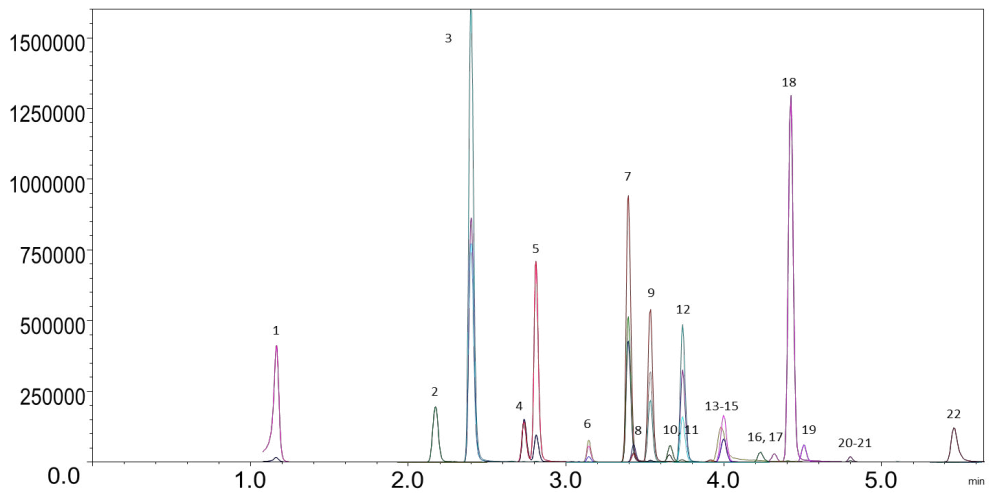
MS Conditions:
Gas Temp: 130 °C
Nebulizer: 25 psi
Gas Flow: 11 L/min
Sheath Gas Heater: 250 °C
Capillary: 3500 V

PFAS Solutions

Data courtesy:
The Center for PFAS Solutions

HALO® PFP, 2.7 µM色谱柱LCMS分离真菌毒素

HALO 90 Å PFP色谱柱可能会面临环境分析的挑战，但是通过提高速度和灵敏度，超越了这些难题。HALO 90 Å PFP色谱柱是环境和真菌毒素分析的理想选择。



PEAK IDENTITIES:

1. Nivalenol
2. Fusarenone X
3. Neosolaniol
4. 15- acetyldeoxynivalenol
5. 3- acetyldeoxynivalenol
6. Aflatoxin M1
7. Diacetoxyscripenol
8. Aflatoxin G2
9. Aflatoxin G1
10. HT2 Toxin
11. Aflatoxin B2
12. Aflatoxin B1
13. Ochratoxin B
14. Citrinin
15. T2 Toxin
16. Ochratoxin A
17. Zearalenone
18. Sterigmatocystin
19. Fumonisin B2
20. Fumonisin B3
21. Fumonisin B1
22. Beauvericin

TEST CONDITIONS:

Column: HALO 90 Å PFP, 2.7 µm, 2.1 x 100 mm
Part Number: 92812-609
Mobile Phase A: Water, 2 mM Ammonium Formate, 0.1% Formic Acid
Mobile Phase B: Methanol, 2 mM Ammonium Formate, 0.1% Formic Acid

Gradient:

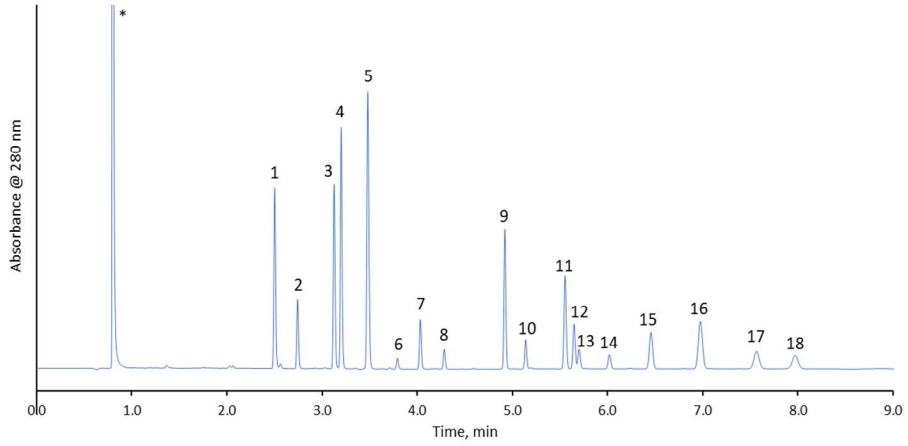
Time	%B
0.0	15
4.5	100
10.0	100

Flow Rate: 0.4 mL/min
Pressure: 280 bar

Temperature: 40 °C
Injection Volume: 7.0 µL
Sample Solvent: Methanol
Detection: +ESI MS/MS
LC System: Shimadzu Nexera X2

HALO® PAH色谱柱分析EPA 610+苯并芘+芘

快速分析EPA 610中指定的16种化合物以及苯并芘和芘，这展示了HALO® PAH色谱柱出色的分析速度和分离度。



PEAK IDENTITIES:

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benzo[a]anthracene
10. Chrysene
11. Benzo[e]pyrene
12. Benzo[b]fluoranthene
13. Perylene
14. Benzo[k]fluoranthene
15. Benzo[a]pyrene
16. Dibenzo[a,h]anthracene
17. Benzo[g,h,i]perylene
18. Indeno[1,2,3-c,d]pyr

* acetone from sample solvent

TEST CONDITIONS:

Column: HALO 90 Å PAH, 2.7 µm, 4.6 x 150 mm
Part Number: 92844-712
Mobile Phase A: Water
B: Acetonitrile

Gradient:

Time	%B
0.0	50
4.5	100
9.0	100
9.5	50
14.0	50

Flow Rate: 1.8 mL/min

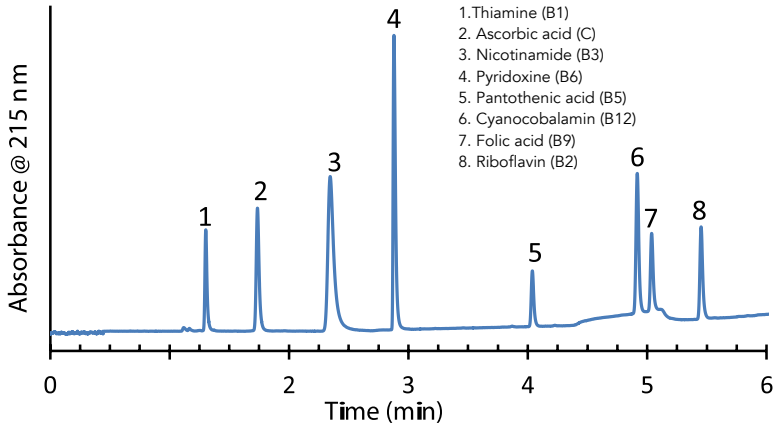
Initial Back Pressure: 416 bar
Temperature: 30 °C
Detection: 280 nm
Injection Volume: 5 µL
Sample Solvent: 80/20 Methanol/Acetone
Data Rate: 40 Hz
Response Time: 0.05 sec.
Flow Cell: 1 µL
LC System: Shimadzu Nexera X2
ESI LCMS system: Shimadzu LCMS-8040

维生素应用

分析科学家们负责在各种基质和传输机理中制定维生素与补充剂的新组合，而色谱法在这一过程中起着关键作用。HALO®色谱柱提供了专为分离维生素及其异构体的独特的化学键合相。

HALO® AQ-C18色谱柱分离水溶性维生素

HALO® AQ-C18色谱柱可用于纯水相或高水相流动相。此应用中，使用0-70%甲醇的梯度，并在初始比例维持1分钟，不到6分钟内，能够很好的分离8种水溶性维生素。



PEAK IDENTITIES:

1. Thiamine (B1)
2. Ascorbic acid (C)
3. Nicotinamide (B3)
4. Pyridoxine (B6)
5. Pantothenic acid (B5)
6. Cyanocobalamin (B12)
7. Folic acid (B9)
8. Riboflavin (B2)

TEST CONDITIONS:

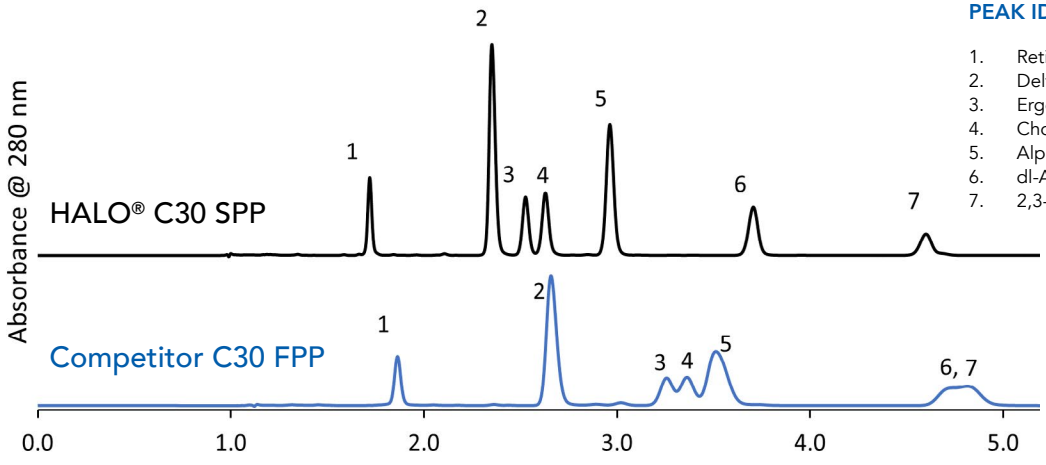
Column: HALO 90 Å AQ-C18, 2.7 µm, 4.6 x 150 mm
Part Number: 92814-722
Mobile Phase: A/B
A= 0.025 M, potassium phosphate in water, pH=2.5 B= Methanol
Gradient:

Time (min.)	%B
0.0	0
1.0	0
6.0	70
10.0	70

Flow Rate: 1.2 mL/min.
Initial Pressure: 243 bar
Temperature: 30°C
Injection Volume: 2.0 µL
Sample Solvent: water
Detection: 215 nm, VWD
Response Time: 0.02 sec.
Data Rate: 25 Hz
Flow Cell: 2.5 µL semi-micro
LC System: Shimadzu Prominence UFLC XR
ECV: ~14 µL

脂溶性维生素的分离：SPP VS. FPP

与竞争对手的FPP C30色谱柱相比，HALO® C30色谱柱对于脂溶性维生素的峰型更尖锐，分离度更高。



PEAK IDENTITIES:

1. Retinyl acetate (Vitamin A)
2. Delta tocopherol (Vitamin E)
3. Ergocalciferol (Vitamin D2)
4. Cholecalciferol (Vitamin D3)
5. Alpha tocopherol (Vitamin E)
6. dl-Alpha-tocopherol acetate (Vitamin E)
7. 2,3-trans-phylloquinone (Vitamin K1)

TEST CONDITIONS:

Column: HALO 160 Å C30, 2.7 µm, 4.6 x 150 mm
Part Number: 92114-730
Competitor FPP: C30, 3.0 µm, 4.6 x 150 mm
Isocratic: 100% Methanol
Flow Rate: 1.5 mL/min

Initial HALO Pressure: 262 bar
Initial Competitor FPP Pressure: 207 bar
Temperature: 30°C
Detection: UV 280 nm, PDA
Injection Volume: 2.0 µL

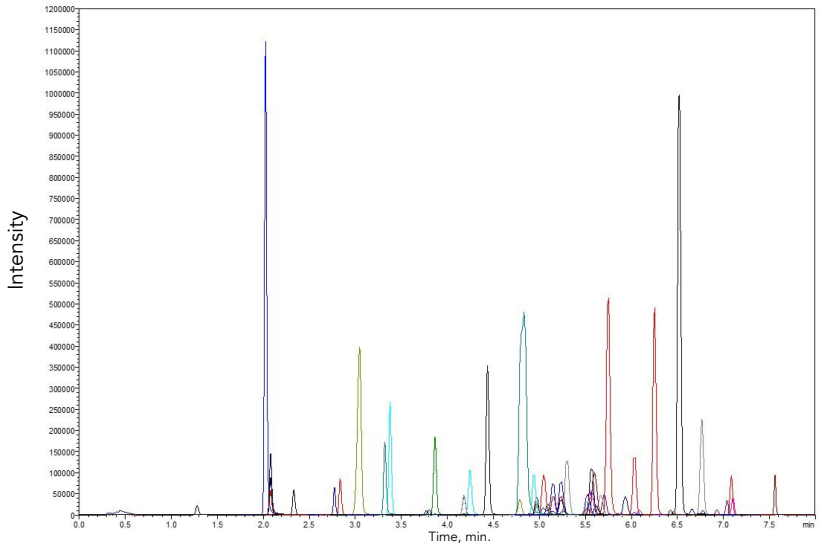
Sample Solvent: Methanol
Data Rate: 40 Hz
Response Time: 0.025 sec.
Flow Cell: 1 µL
LC System: Shimadzu Nexera X2

大麻制品应用

色谱法有助于发现和鉴定从大麻等天然产物中提取的药物。研究表明，复杂的大麻提取物能够减轻疼痛并改善健康状况。分析科学家面临的挑战是如何确定成分、量化并生产出充分发挥其功效的药剂。HALO® 色谱柱采用 Fused-Core® 技术，为具有挑战性的大麻基质提供了稳定且高效的分离。

HALO® AQ-C18色谱柱LC-MS分离农药混合物

俄罗冈州农药清单包含59种化合物，其中2种是异构体（多杀菌素A和D以及除虫菊酯I 和 II）。除氟地昔尼和氟虫腈易于被氧化而使用负离子模式之外，其他所有化合物均采用正离子ESI模式运行。

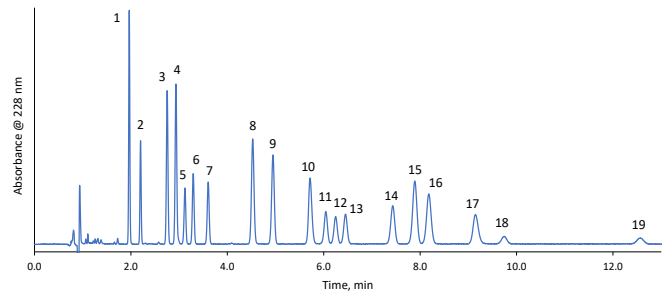


PEAK IDENTITIES:

1. Daminozide
2. Acephate
3. Oxamyl
4. Flonicamid
5. Methomyl
6. Thiamethoxam
7. Imidacloprid
8. Dimethoate
9. Acetamiprid
10. Aldicarb
11. Thiacloprid
12. Dichlorvos
13. Propoxur
14. Carbofuran
15. Carbaryl
16. Imazalil
17. Metalaxyl
18. Naled
19. Parathion methyl
20. Chlorantraniliprole
21. Spiroxamine
22. Phosmet
23. Methiocarb
24. Azoxystrobin
25. Paclobutrazol
26. Boscalid
27. Fludioxinil
28. Malathion
29. Myclobutanil
30. Spirotetramat
31. Ethoprophos
32. Bifenazate
33. Pyrethrin I
34. Fipronil
35. Fenoxycarb
36. Tebuconazole
37. Kresoxim-methyl
38. Propiconazole
39. Diazinon
40. Spinosad A
41. MGK 264
42. Prallethrin
43. Spinosad D
44. Pyrethrin II
45. Chlorfenapyr
46. Trifloxystrobin
47. Clofentezine
48. Piperonyl butoxide
49. Hexythiazox
50. Chlorpyrifos
51. Spiromesifen
52. Etoxazole
53. Fenpyroximate
54. Cyfluthrin
55. Cypermethrin
56. Pyridaben
57. Abamectin
58. Permethrin
59. Etofenprox
60. Bifenthrin
61. Acequinocyl

* To view the complete test conditions for app note 333, visit halocolumns.com

HALO® LPH-C18分离19种大麻素



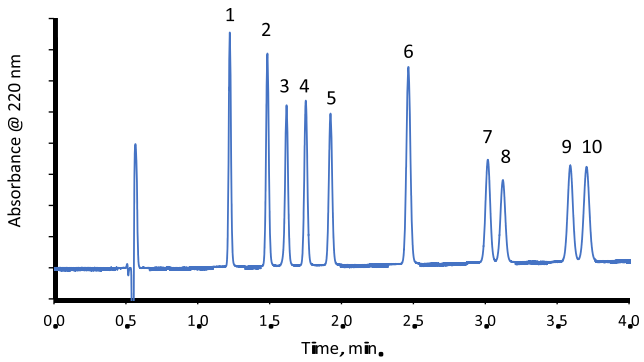
TEST CONDITIONS:

Column: HALO 90 Å LPH-C18, 2.7 µm, 4.6 x 150mm
Part Number: 92824-716
Mobile Phase A: 5 mM Ammonium Formate, 0.1% Formic Acid
Mobile Phase B: Acetonitrile, 0.05% Formic Acid
Isocratic: 75% B
Flow Rate: 1.5 mL/min
Pressure: 232 bar
Temperature: 30°C
Detection: PDA, UV: 228 nm
Injection Volume: 1 µL
Sample Solvent: 75/25 MeOH/ Water
Data Rate: 100 Hz
Response Time: 0.025 sec.
Flow Cell: 1 µl
LC System: Shimadzu Nexera X2

PEAK IDENTITIES:

1. Cannabidivarinic acid (CBDVA)
2. Cannabidivarin (CBDV)
3. Cannabidiolic acid (CBDA)
4. Cannabigerolic acid (CBGA)
5. Cannabigerol (CBG)
6. Cannabidiol (CBD)
7. Tetrahydrocannabivarin (THCV)
8. Tetrahydrocannabivarinic acid (THCVA)
9. Cannabinol (CBN)
10. Cannabinolic acid (CBNA)
11. Exo-tetrahydrocannabinol (EXO-THC)
12. delta 9- Tetrahydrocannabinol (D9-THC)
13. delta 8- Tetrahydrocannabinol (D8-THC)
14. Cannabicycol (CBL)
15. Cannabichromene (CBC)
16. Tetrahydrocannabinolic acid A (THCA-A)
17. Cannabichromenic acid (CBCA)
18. Cannabicyclolic acid (CBLA)
19. Cannabitriol (CBT)

10种主要大麻素的快速分离



TEST CONDITIONS:

Column: HALO 90 Å C18, 2.7 µm, 4.6 x 100 mm
Part Number: 92814-602
Mobile Phase A: Water/0.1% formic acid
Molbile Phase B: Acetonitrile/0.085% formic acid
Gradient: 77-85% B in 4 min
Flow Rate: 1.5 mL/min
Initial Pressure: 197 bar
Temperature: 38 °C
Detection: UV 220 nm, PDA
Injection Volume: 1.3 µL
Dwell Volume: 0.471 mL
Sample Solvent: 75/25 methanol/water
Response Time: 0.025 sec
Data Rate: 100 Hz
Flow Cell: 1.0 µL
LC System: Shimadzu Nexera X2

PEAK IDENTITIES:

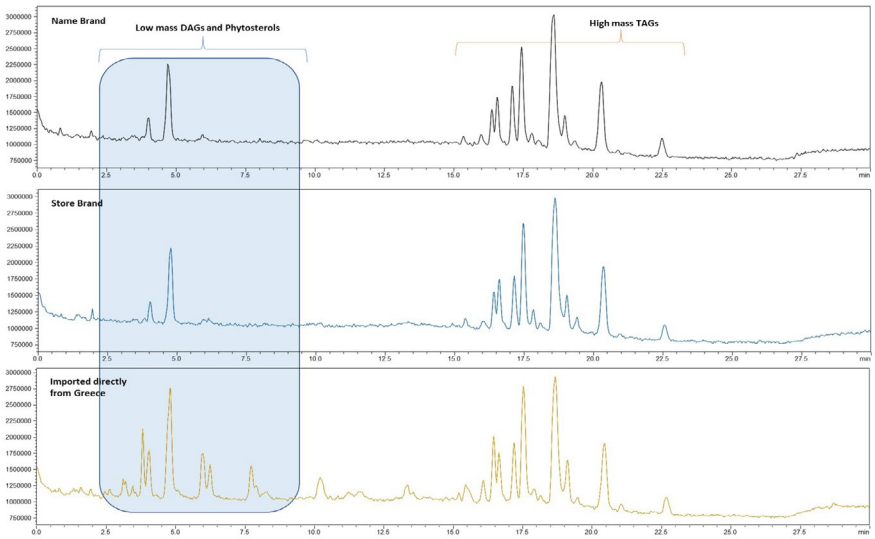
1. Cannabidivarin (CBDV)
2. Cannabidiolic acid (CBDA)
3. Cannabigerol (CBG)
4. Cannabidiol (CBD)
5. Tetrahydrocannabivarin (THCV)
6. Cannabinol (CBN)
7. delta-9-Tetrahydrocannabinol (Δ9-THC)
8. delta-8-Tetrahydrocannabinol (Δ8-THC)
9. Cannabichromene (CBC)
10. delta-9-Tetrahydrocannabinolic acid A (THCA)

食品饮料应用

营养对于生命至关重要，通过食品饮料，人们获得了生活的乐趣。食品科学家依靠色谱来开发新的配方，并确保我们的食品安全。食品基质会带来一些分析上的挑战，HALO®色谱柱的设计，使其与全多孔硅胶相比，能耐受更脏的样品基质。

HALO® C30色谱柱LCMS分析橄榄油

HALO® C30色谱柱可以实现植物油（如橄榄油）的复杂分离，并用于产品的质量检测。



TEST CONDITIONS:

Column: HALO 160 Å C30, 2.7µm, 2.1 x 150 mm
Part Number: 92112-730
Mobile Phase A: Methanol
Mobile Phase B: IPA/0.1% Formic Acid
Gradient:

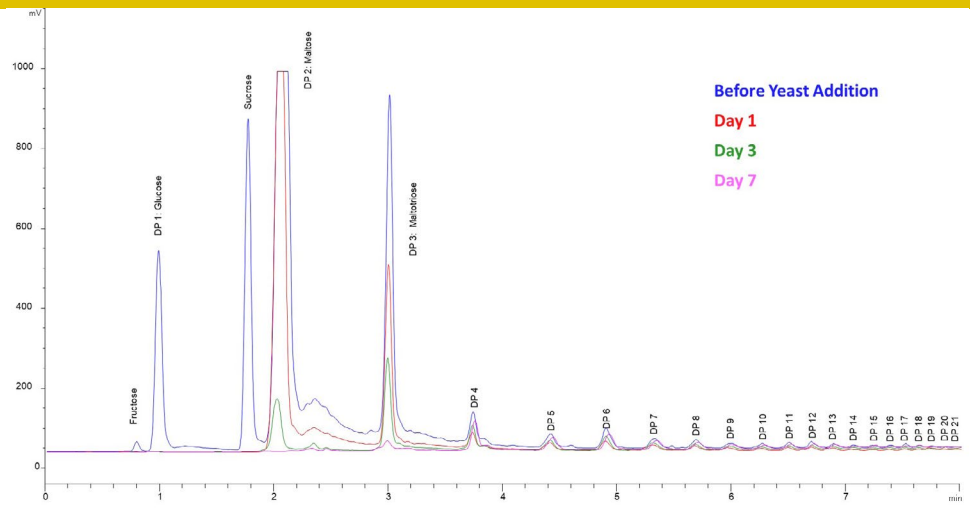
Time	%B
0.00	10
10.00	10
14.00	40
25.00	40
25.01	10
30.00	10

Flow Rate: 0.3 mL/min
Temperature: Ambient
Injection Volume: 2 µL
Sample Solvent: MeOH
LC System: Shimadzu Nexera X2
MS System: Shimadzu 2020

使用HALO® PENTA-HILIC色谱柱监测啤酒发酵过程

使用HALO® Penta-HILIC色谱柱搭配ELSD检测器分析比利时麦芽酒。在整个发酵过程中监测单糖、低聚糖和多糖水平以监控发酵行为，从而跟踪酵母的表现。

使用Penta-HILIC/ELSD组合是进行糖类快速分析的好方法，该方法可以在高温条件下提高分离度并获得良好的峰形。



TEST CONDITIONS:

Column: HALO 90 Å Penta-HILIC, 2.7 µm, 3.0 x 50 mm
Part Number: 92813-405
Mobile Phase A: Water
Mobile Phase B: Acetonitrile
Gradient:

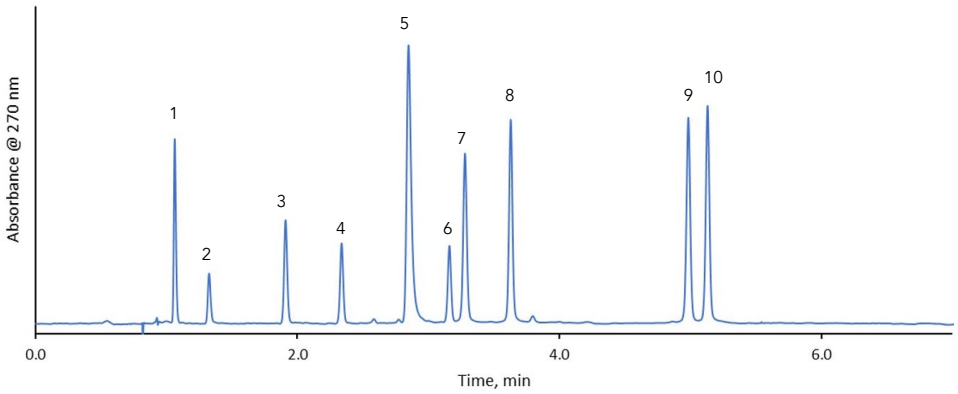
Time	%B
0.0	92
8.0	52

Flow Rate: 0.75 mL/min
Temperature: 65 °C
Detection: ELSD, 40°C, 45 psi
Injection Volume: 2 µL
Data Rate: 10 Hz, 2 sec filter

Data Courtesy: ACCTA, Inc.

茶叶中常见的儿茶素和咖啡因的分离

UV条件下，儿茶素和咖啡因标准品在HALO® LPH-C18色谱柱展示了优异的分离。
该色谱柱具有空间配体保护，可以防止酸水解并减少保留时间漂移，是低pH分离的理想选择。



PEAK IDENTITIES:

1. Gallic Acid
2. Gallocatechin
3. Epigallocatechin
4. Catechin
5. Caffeine
6. Epicatechin
7. Epigallocatechin Gallate
8. Gallocatechin Gallate
9. Epicatechin Gallate
10. Catechin Gallate

TEST CONDITIONS:

Column: HALO 90 Å LPH-C18 2.7 µm, 4.6 x150 mm
Part Number: 92824-716
Mobile Phase A: Water, 0.2% Formic Acid (pH: 2.45)
Mobile Phase B: Acetonitrile, 0.2% Formic Acid

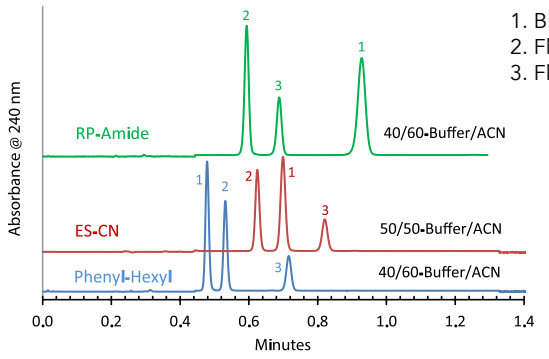
Gradient:

Time	%B
0.0	10
0.5	10
6.0	23
7.0	23

Flow Rate: 1.8 mL/min
Pressure: 395 bar
Temperature: 40 °C
Detection: PDA, UV 270 nm
Injection Volume: 5 µL
Sample Solvent: 90/10 Water/ Acetonitrile
LC System: Shimadzu Nexera X2

HALO® RP-AMIDE, ES-CN 和PHENYL-HEXYL分离黄酮类化合物

键合相的多种选择使方法开发和优化更具灵活性。
请注意分离时间短和适中的背压。



PEAK IDENTITIES:

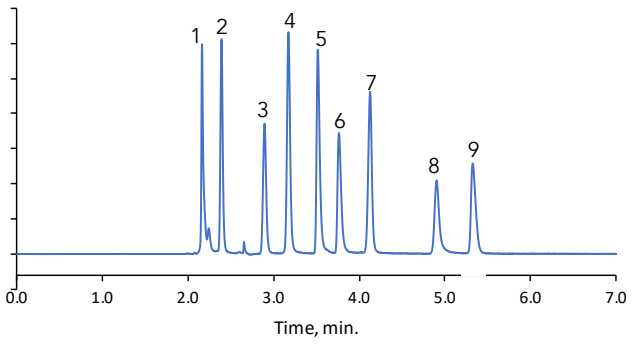
1. Biochanin A
2. Flavone
3. Flavanone

TEST CONDITIONS:

Columns:
1) HALO 90 Å RP-Amide, 2.7 µm, 4.6 x 50 mm
Part Number: 92814-407
2) HALO 90 Å ES-CN, 2.7 µm, 4.6 x 50 mm
Part Number: 92814-404
3) HALO 90 Å Phenyl-Hexyl, 2.7 µm, 4.6 x 50 mm
Part Number: 92814-406
Mobile Phase: A/B - See chart
A: 0.02 M Potassium phosphate buffer, pH 2.9
B: Acetonitrile
Flow Rate: 2.0 mL/min
Pressure: ~170 bar
Temperature: 30 °C
Detection: UV 240 nm, VWD
Injection Volume: 1.0 µL
Sample Solvent: 50/50 water/acetonitrile
Response Time: 0.02 sec
Data Rate: 25 Hz
Flow Cell: 2.5 µL semi-micro
LC System: Shimadzu Prominence UFLC XR
Extra Column Volume: ~14 µL

使用HALO® AQ-C18色谱柱分离极性有机酸

使用HALO® AQ-C18色谱柱在纯水相条件下分离9种极性有机酸。



TEST CONDITIONS:

Column: HALO 90 Å AQ-C18, 2.7 µm, 4.6 x 250 mm
Part Number: 92814-922
Isocratic: 20 mM potassium phosphate buffer, pH 2.7
Flow Rate: 1.0 mL/min
Pressure: 307 bar
Temperature: 40 °C
Detection: UV 214 nm, PDA
Injection Volume: 20 µL
Sample Solvent: Mobile phase
Response Time: 0.025 sec
Data Rate: 100 Hz
Flow Cell: 1.0 µL
LC System: Shimadzu Nexera X2

PEAK IDENTITIES:

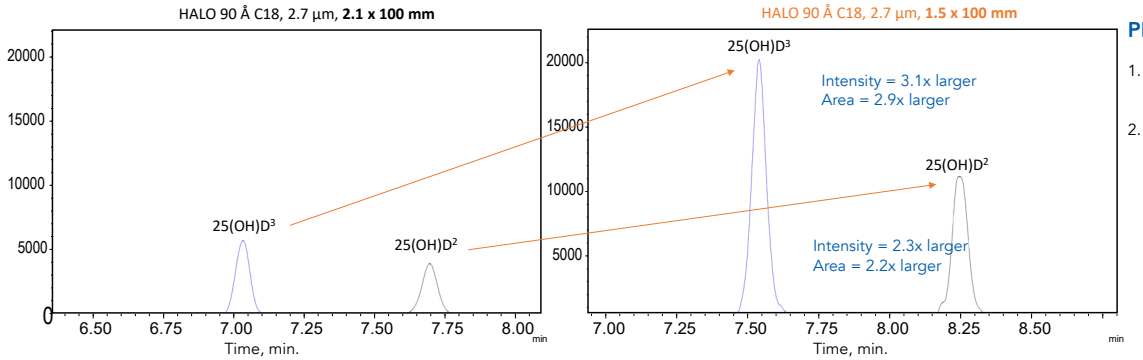
1. Oxalic acid
2. Tartaric acid
3. Malic acid
4. Ascorbic acid
5. L-Lactic acid
6. Acetic acid
7. Citric acid
8. Succinic acid
9. Fumaric acid

临床应用

了解人体系统及各种外源性的自然或非自然物质对其影响，可以帮助科学家们更清楚地了解其因果关系及其影响。而随着对灵敏度要求的增加，获得这些知识需要最先进的工具。HALO®(U)HPLC/MS色谱柱专为快速、高效的分离而设计，使其成为时间和准确性都至关重要的高通量临床实验室的理想选择。

使用HALO 1.5MM色谱柱提高维生素D代谢物的LCMS响应

分别在1.5mm和2.1mm色谱柱上分离两种维生素D代谢物。与2.1mm色谱柱相比，1.5mm色谱柱的响应更高。
凭借更高的电离效率，1.5mm色谱柱可以使维生素D代谢物达到其LOD。



PEAK IDENTITIES

1. 25-Hydroxyvitamin D3 (25(OH)D3) m/z - 383.4
2. 25-Hydroxyvitamin D2 (25(OH)D2) m/z - 395.3

TEST CONDITIONS:

Column: HALO 90 Å C18, 2.7 µm, 2.1x100 mm
Part Number: 92812-602
Column: HALO 90 Å C18, 2.7 µm, 1.5x100 mm
Part Number: 9281X-602
Tubing (Column to Source):
AMT MarvelXACT™ 50 µm x 600 mm
Part Number: PS7050600
Mobile Phase A: Water, 0.1 % Formic Acid
Mobile Phase B: ACN, 0.1 % Formic Acid

Gradient:

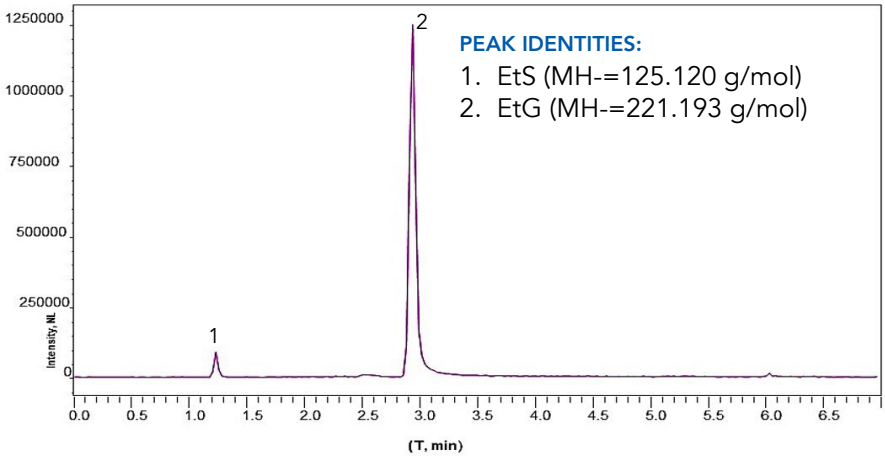
Time	%B
0.00	50
10.80	92.5
11.48	95
12.75	100
13.75	100
14.25	50
20.00	End

Flow Rate: 0.4 mL/min for 2.1 mm
0.2 mL/min for 1.5 mm
Pressure: 370 bar for 2.1 mm
229 bar for 1.5 mm
Temperature: 40 °C
Injection Volume: 1.0 µL @ 500 ppb
Sample Solvent: 50/50/ ACN/H_2O
Detection: +ESI/APCI MS/MS
LC System: Shimadzu Nexera X2
ESI LCMS System: Shimadzu LCMS-8040

MS CONDITIONS:
Detection: ESI +/APCI
Spray Voltage: 4.5 kV
Nebulizing gas: 2 L/min
Drying gas: 15 L/min
DL temp: 250 °C
Heat Block: 300 °C

2 µM HALO® PENTA-HILIC色谱柱LCMS分离尿液中的ETG/ETS

乙基葡萄糖醛酸苷（EtG）和硫酸乙酯（EtS）是尿液中乙醇的代谢物。
这些物质的存在可以确定是否摄入了酒精性饮料，零容忍程序经常使用这项测试。



PEAK IDENTITIES:

1. EtS (MH-=125.120 g/mol)
2. EtG (MH-=221.193 g/mol)

TEST CONDITIONS:

Column: HALO 90 Å Penta-HILIC, 2 µm 2.1 x 100mm
Part Number: 91812-605
Mobile Phase A: 5 mM ammonium formate/ 0.1% formic acid in 95:5 ACN/water
Mobile Phase B: 5mM ammonium formate/ 0.1% formic acid in 80:20 ACN/water

Gradient:

Time	%B
0.00	0
1.00	100
5.00	100
5.01	0
7.00	END

Flow Rate: 0.4 mL/min
Initial Pressure: 325 bar
Temperature: 40 °C
Injection Volume: 2 µL
Sample prep: 5ng/mL EtG/EtS in 20 uL of synthetic urine.
10 fold dilution with mobile phase A.

MS CONDITIONS:

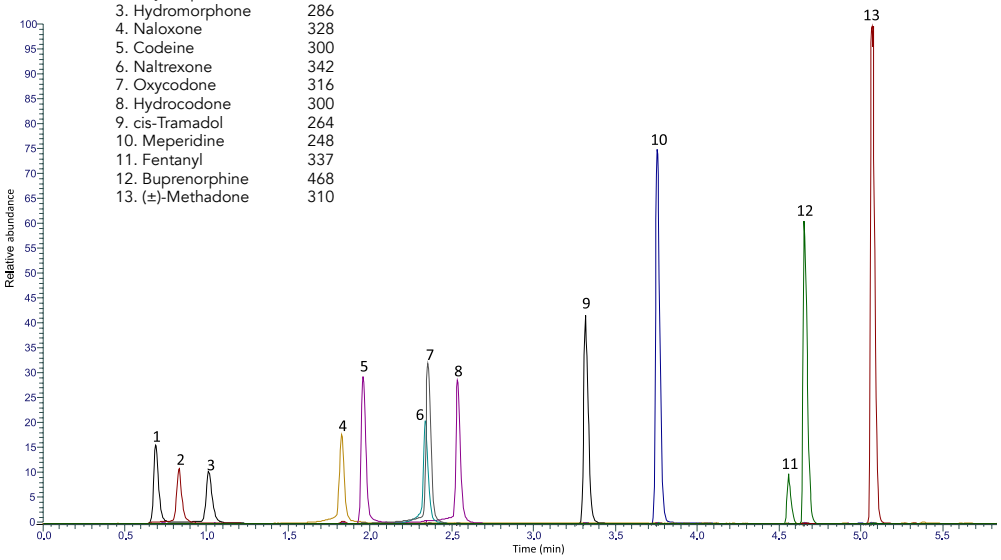
LCMS system: Shimadzu LCMS-2020
Detection: -ESI MS
Spray voltage: 4.50 kV
Drying line temp: 300 °C
Heat Block: 450 °C

HALO® BIPHENYL色谱柱高通量LCMS分离阿片类止痛药

2.0 µm HALO® Biphenyl色谱柱是高通量分离含同分异构体的止痛药的理想选择。
请注意可待因和氢可酮(分别为峰5和峰8)以及吗啡和氢吗啡酮(分别为峰1和峰3)之间的分离。

PEAK IDENTITIES: m/z

1. Morphine	286
2. Oxymorphone	302
3. Hydromorphone	286
4. Naloxone	328
5. Codeine	300
6. Naltrexone	342
7. Oxycodone	316
8. Hydrocodone	300
9. cis-Tramadol	264
10. Meperidine	248
11. Fentanyl	337
12. Buprenorphine	468
13. (±)-Methadone	310



TEST CONDITIONS:

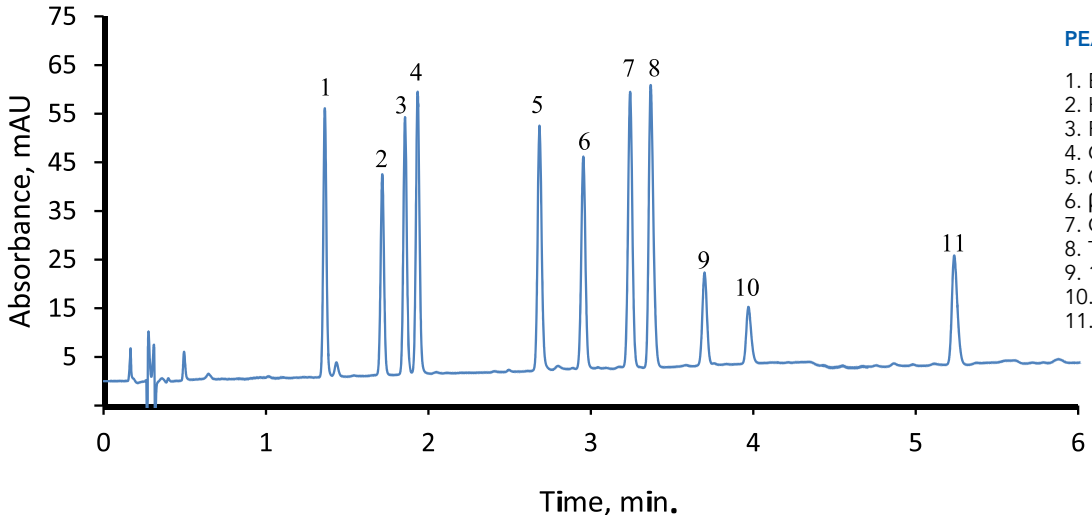
Column: HALO 90 Å Biphenyl, 2.0 µm, 2.1 x 100 mm
Part Number: 91812-611
Mobile Phase:
A: Water/0.1% formic acid
B: Acetonitrile/0.1% formic acid

Gradient:	Time (min)	% B
	0.00	10
	2.22	20
	5.00	60
	5.50	60
	5.51	10
	6.50	END

Flow Rate: 0.4 mL/min
Initial Pressure: 325 bar
Temperature: 40 °C
Detection: +ESI MS
Injection Volume: 1.0 µL
Sample Solvent: 95/5 water/acetonitrile
LC System: Shimadzu Nexera X2

类固醇的高效分离

使用HALO 90 Å Biphenyl色谱柱在6分钟内梯度分离11种类固醇混合物。
色谱图显示,所有峰都达到很好的分离,且峰形好、柱效高。



PEAK IDENTITIES:

1. Estriol
2. Hydrocortisone
3. Prednisone
4. Cortisone
5. Corticosterone
6. β-Estradiol
7. Cortisone Acetate
8. Testosterone
9. 17-α-Hydroxyprogesterone
10. 11-Deoxycorticosterone
11. Progesterone

TEST CONDITIONS:

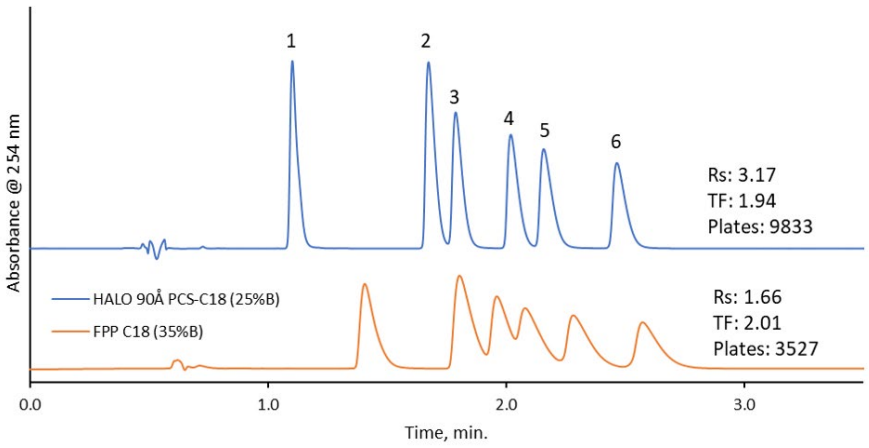
Column: HALO 90 Å Biphenyl, 2.0 µm, 2.1 x 100 mm
Part Number: 91812-611
Mobile Phase:
A: Water/0.1% formic acid
B: Acetonitrile/0.1% formic acid

Gradient:	Time (min)	% B
	0.00	10
	2.22	20
	5.00	60
	5.50	60
	5.51	10
	6.50	END

Flow Rate: 0.4 mL/min
Initial Pressure: 325 bar
Temperature: 40 °C
Detection: +ESI MS
Injection Volume: 1.0 µL
Sample Solvent: 95/5 water/acetonitrile
LC System: Shimadzu Nexera X2

使用HALO 90 Å PCS C18色谱柱分离抗抑郁药

如碱性抗抑郁药应用所示，相比于竞争对手的全多孔C18，HALO® Fused-Core® PCS对碱性化合物的载样量更高。表面带正电的（PCS）键合相是使用低离子强度流动相（如：甲酸）分离碱性化合物的理想选择。



PEAK IDENTITIES:

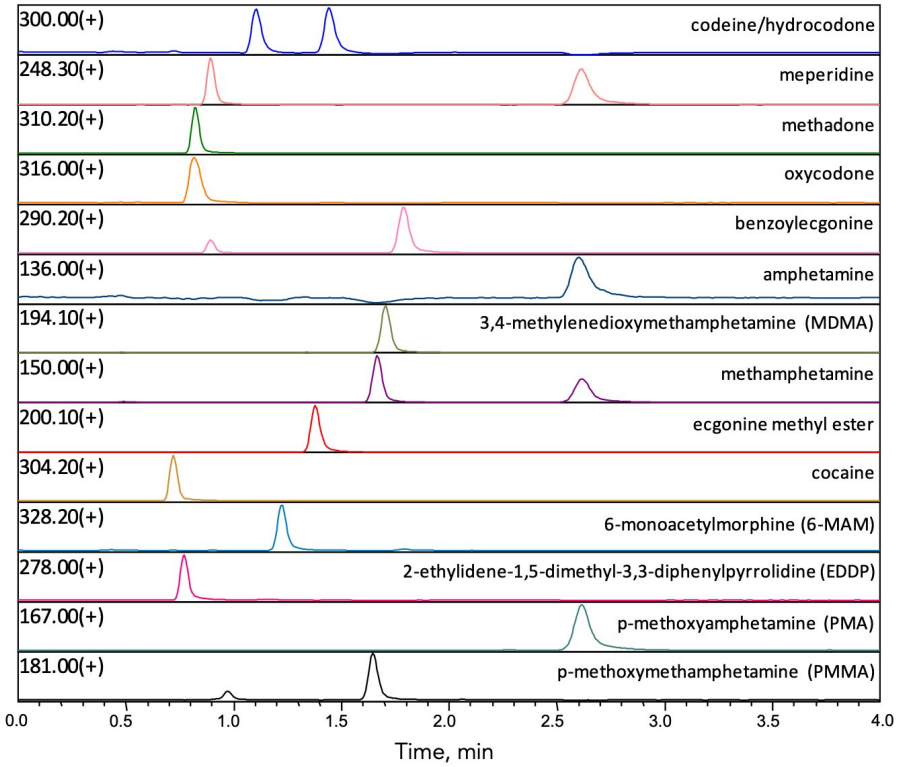
1. Doxepin
2. Desipramine
3. Imipramine
4. Nortriptyline
5. Amitriptyline
6. Trimipramine

TEST CONDITIONS:

Column: HALO 90 Å PCS C18, 2.7 µm, 2.1 x 100 mm
Part Number: 92812-617
Competitor Column: FPP C18, 3 µm, 2.1 x 100 mm
Mobile Phase A: Water, 0.1% Formic Acid
Mobile Phase B: Acetonitrile, 0.1% Formic Acid
Isocratic: HALO® PCS C18: 25 %B
FPP C18: 35 %B
Flow Rate: 0.4 mL/min
Back Pressure: 267 bar
Temperature: 35 °C
Injection: 0.5 µL (40 µg)
Sample Solvent: 75/25 Water/ ACN
Wavelength: PDA, 254 nm
Flow Cell: 1 µL
Data Rate: 100 Hz
Response Time: 0.025 sec.
LC System: Shimadzu Nexera X2

HALO® PENTA-HILIC色谱柱LC-MS分离滥用药物及其代谢物

使用HALO® Penta-HILIC色谱柱和选择性离子检测技术（SIM）快速识别滥用药物及其代谢物，并提高了灵敏度。(改编自 J. Pharm. Anal. 2013; 3 (5): 303-311).



TEST CONDITIONS:

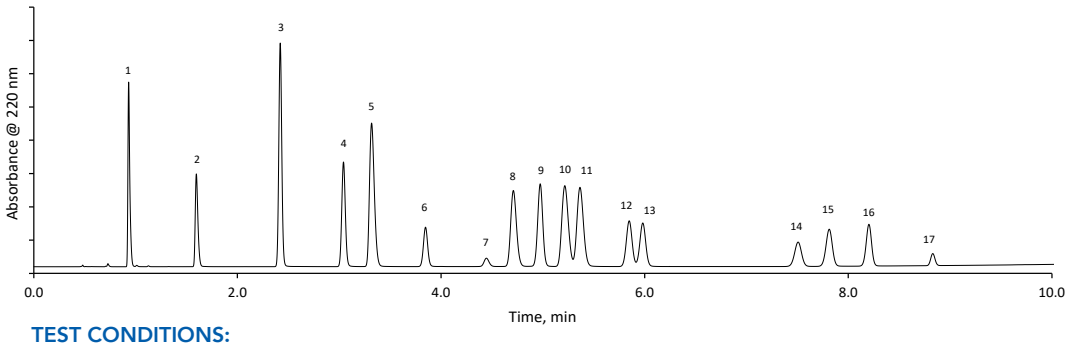
Column: HALO 90 Å Penta-HILIC, 2.7 µm, 2.1 x 100 mm
Part Number: 92812-605
Mobile Phase:
A: 5 mM Ammonium formate, pH 3.0
B: Acetonitrile
Isocratic: Pre-mixed 5/95 - A/B
Flow Rate: 0.5 mL/min
Pressure: 149 bar
Temperature: 60 °C
Detection: Selected Ion Monitoring as indicated
Injection Volume: 1.0 µL
Sample Solvent: 90/10 ACN/water
MS Parameters: Positive ion mode, 2 kV, 400 °C heat block 225 °C capillary
LC-MS System: Shimadzu Nexera and LCMS-2020 (single quadrupole MS)

工业应用

工业科学家们每天面临着各种复杂多变的分析挑战，而色谱法是获得重要数据的工具之一。LC和LCMS通常与工业应用中常用的GC和GCMS技术互补。不同的粒径、孔径以及多种键合相，使HALO®色谱柱在LC方法开发过程中成为不错的选择。

2 µM HALO® C18色谱柱UHPLC快速分离爆炸物

EPA 8330B表述了环境中爆炸物的检测方法，采用HALO 90 Å 2 µm C18色谱柱和水/甲醇的梯度条件，能在10分钟内分离17种爆炸物。



TEST CONDITIONS:

Column: HALO 90 Å C18, 2 µm, 3.0 x 100 mm
Part Number: 91813-602
Mobile Phase A: Water
Mobile Phase B: Methanol
Gradient:

Time	%B
0.0	25
6.9	35
9.9	62

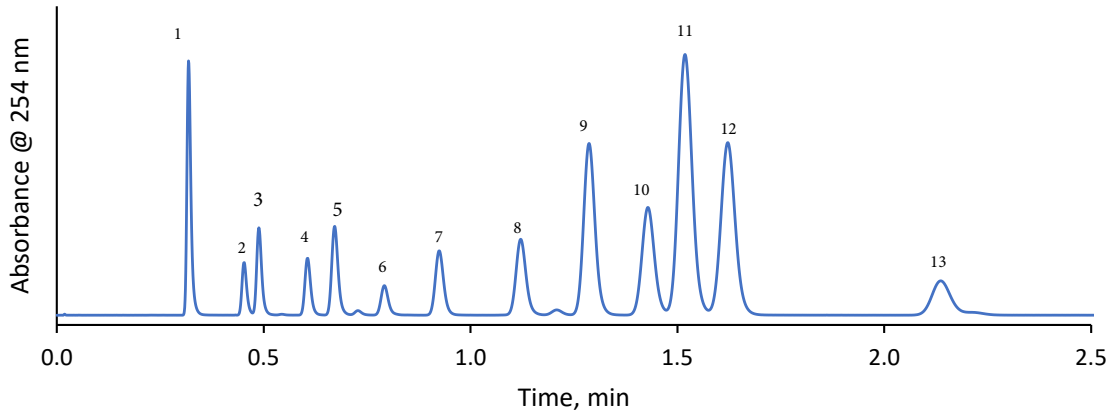
Flow Rate: 0.85 mL/min
Initial Back Pressure: 571 bar
Temperature: 43°C
Detection: 220 nm
Injection Volume: 0.2 µL
Sample Solvent: Methanol
Data Rate: 100 Hz
LC System: Shimadzu Nexera X2

PEAK IDENTITIES:

1. HMX
2. RDX
3. 1,3,5-Trinitrobenzene
4. 1,3-Dinitrobenzene
5. 3,5-Dinitroaniline
6. Nitrobenzene
7. Nitroglycerin
8. Tetryl
9. 2,4,6-Trinitrotoluene
10. 2-Amino-4,6-dinitrotoluene
11. 4-Amino-2,6-dinitrotoluene
12. 2,4-Dinitrotoluene
13. 2,6-Dinitrotoluene
14. 2-Nitrotoluene
15. 4-Nitrotoluene
16. 3-Nitrotoluene
17. PETN (pentaerythritol tetranitrate)

HALO® C8色谱柱分离邻苯二甲酸酯类以及中性化合物

HALO® C8色谱柱快速高效分离邻苯二甲酸酯类以及中性化合物。



TEST CONDITIONS:

Column: HALO 90 Å C 8, 2.7 µm, 4.6 x 50 mm
Part Number: 92814-408
Mobile Phase:
A: Water
B: 70/30 Acetonitrile/ Methanol
Isocratic: 68%
Flow Rate: 1.5 mL/min
Pressure: 136 bar

Temperature: 27 °C
Detection: UV 254 nm, VWD
Injection Volume: 1.0 µL
Sample Solvent: Acetonitrile
Response Time: 0.02 sec
Flow Cell: 2.5 µL semi-micro
LC System: Shimadzu Prominence UFLC XR

PEAK IDENTITIES:

1. Uracil
2. 1-Indanol
3. Dimethyl phthalate
4. Anisole
5. Diethyl phthalate
6. Benzophenone
7. Naphthalene
8. Dipropyl phthalate
9. Hexanophenone
10. Phenanthrene
11. Anthracene
12. 3-phenyltoluene
13. Dibutyl phthalate

全新的HALO® 1.5 MM – 色谱分离中的一个新维度

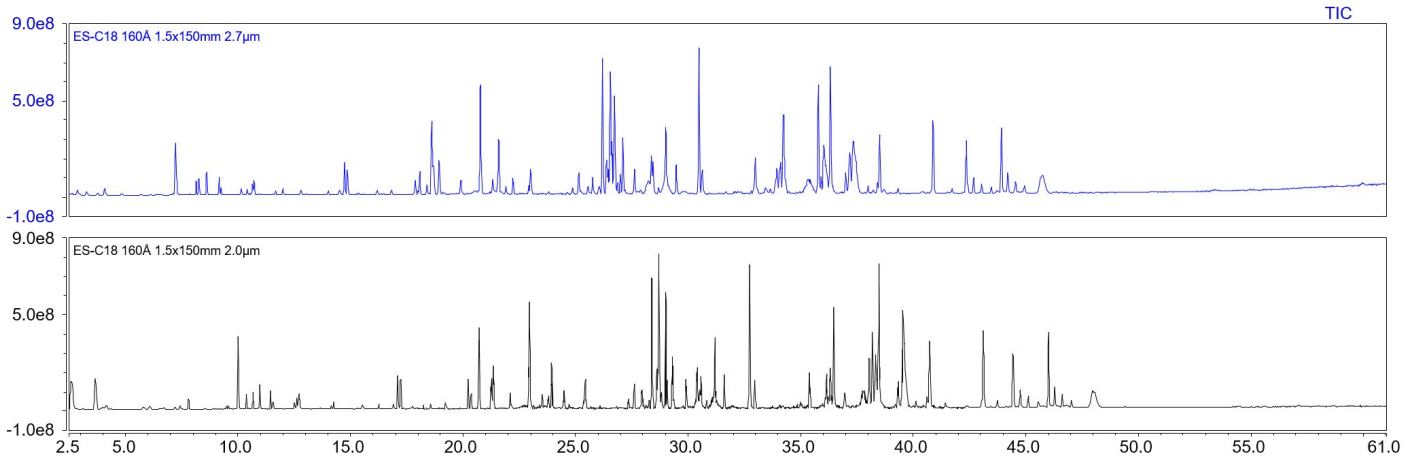
AMT再次以1.5mm内径的HALO®色谱柱突破了UHPLC系统的边界。基于Fused-Core® 颗粒的所有优点，HALO®1.5提供更高的灵敏度，并减少溶剂消耗，让色谱科学家体验到毛细管柱的好处，但不会带来微流系统的痛苦。

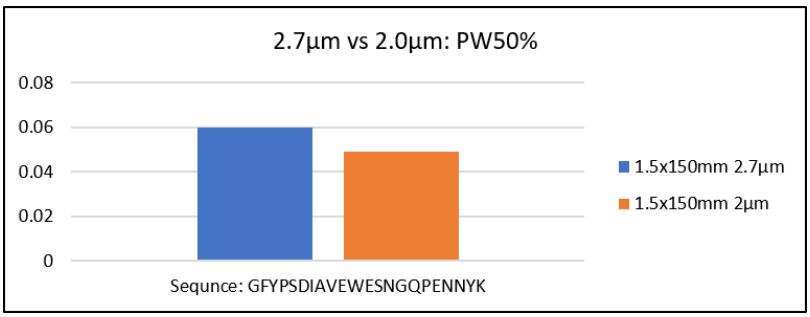
提供更高的性能

- ✓ 在常规的UHPLC系统上获得更高的灵敏度
- ✓ LCMS系统上获得更高的离子化效应
- ✓ 与2.1mm色谱柱相比，溶剂消耗减少
- ✓ 易于实现微流解决方案

使用2µM 1.5MM内径色谱柱提高曲妥珠单抗消化物的灵敏度

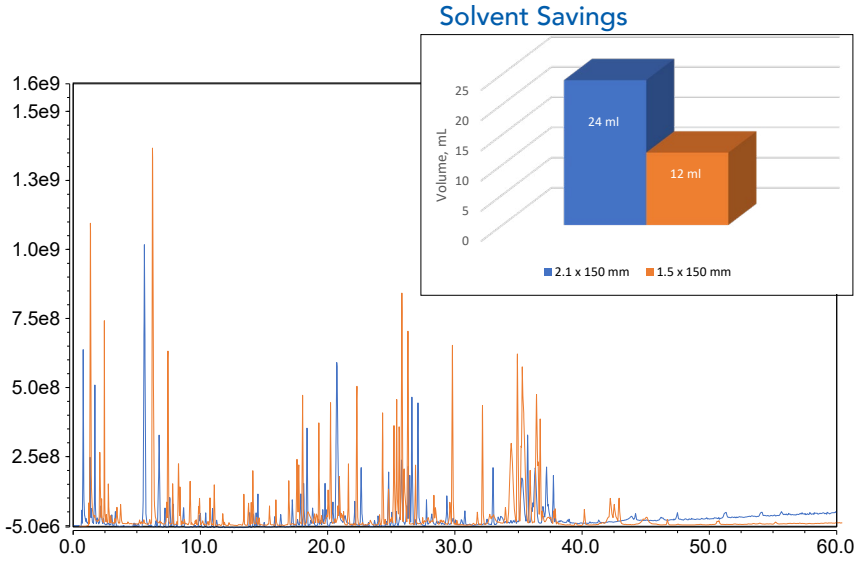
分别使用两根不同的HALO®色谱柱测试MS全扫描的肽图。
比较1.5 mm 2.7µm ES-C18色谱柱和1.5 mm 2µm ES-C18色谱柱的特点。





内径1.5MM HALO 160 Å ES-C18色谱柱用于肽图分析，能节省大量溶剂

使用1.5mm色谱柱与2.1mm色谱柱分离曲妥珠单抗肽图时，与2.1mm色谱柱的0.4 mL/min相比，1.5mm色谱柱只以0.2 mL/min运行，可以节省50%溶剂！
不仅节省溶剂，还可以降低废液处理的成本。且1.5 mm内径色谱柱响应更高，更容易检出低丰度肽。



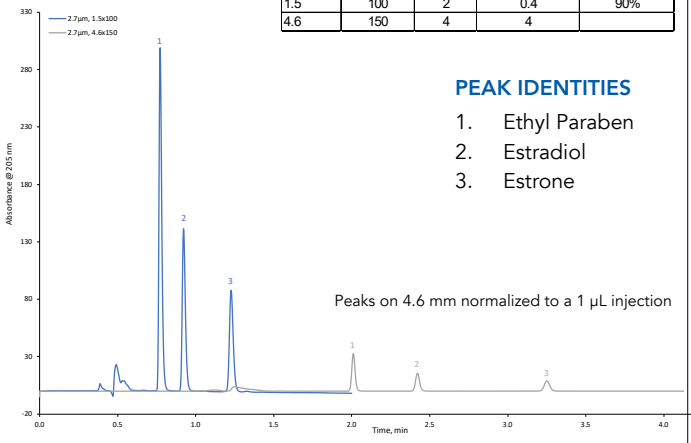
TEST CONDITIONS:

Column: HALO 160 Å ES-C18, 2.7 µm, 1.5 x 150 mm
Column: HALO 160 Å ES-C18, 2.7 µm, 2.1 x 150 mm
Mobile Phase **A:** Water/0.1% DFA
B: Acetonitrile/0.1% DFA
Gradient: 2-50 %B in 60 min
Flow Rate: 0.2 mL/min for 1.5 mm ID
0.4 mL/min for 2.1 mm ID
Back Pressure: 310 bar (1.5 mm)
444 bar (2.1 mm)
Temperature: 60 °C
Detection: ESI +
Injection Volume: 2 µL of 1.25 mg/mL Trastuzumab tryptic digest
Sample Solvent: 1.5 M Guanidine HCl/0.5% Formic Acid
LC System: Shimadzu Nexera X2
MS System: ThermoFisher Q Exactive

根据USP<621>指导原则，优化雌二醇的方法

优化雌二醇的USP方法以节约时间、减少溶剂消耗、节省样品使用量并提高信号强度。

ID (mm)	Length (mm)	Time (Min)	Solvent Used (mL)	Solvet Saved (%)
1.5	100	2	0.4	90%
4.6	150	4	4	



PEAK IDENTITIES

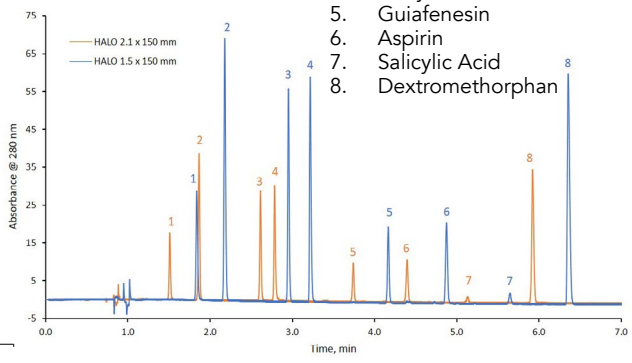
1. Ethyl Paraben
2. Estradiol
3. Estrone

TEST CONDITIONS:

Column: HALO 90Å C18, 2.7 µm, 4.6 x 150 mm
Column: HALO 90Å C18, 2.7 µm, 1.5 x 100 mm
Mobile Phase A: Water
Mobile Phase B: ACN
Isocratic: 45/55 Water/ACN
Flow Rate: 1.0 mL/min for 4.6mm
0.2 mL/min for 1.5mm
Pressure: 248 bar/4.6mm
313 bar/1.5mm
Temperature: 25 ºC
Detection: UV 205 nm, PDA
Injection Volume: 1.0 µL
Sample Solvent: 45/55 Water/MeOH
Data Rate: 100 Hz
Response Time: 0.025 sec.
Flow Cell: 1µL
Instrument: Shimadzu Nexera X2

提高咳嗽和感冒药等小分子化合物的响应

使用1.5mm内径的 HALO 90 Å C18色谱柱分离咳嗽和感冒药中常见的8种小分子化合物。



PEAK IDENTITIES

1. Phenylephrine
2. Acetaminophen
3. Caffeine
4. Doxylamine
5. Guiafenesin
6. Aspirin
7. Salicylic Acid
8. Dextromethorphan

TEST CONDITIONS:

Column: HALO 90 Å C18, 2.7 µm, 1.5 x 150 mm
Part Number: 9281X-702
Column: HALO 90 Å C18, 2.7 µm, 2.1 x 150 mm
Mobile Phase A: Water/ 0.15% TFA
Mobile Phase B: ACN/ 0.1% TFA
Gradient:

Time(min)	%B
0.0	5
8.0	50
9.0	100
9.5	5
13.0	5

Flow Rate: 0.2 mL/min for 1.5 mm
0.4 mL/min for 2.1 mm
Pressure: 425 bar/1.5 mm
470 bar/2.1 mm
Temperature: 35 °C
Detection: UV 280 nm, PDA
Injection Volume: 0.5 µL
Data Rate: 100Hz
Response Time: 0.025 sec.
Flow Cell: 1 µL
Instrument: Shimadzu Nexera X2

色谱柱连接

选择最佳连接管路以最大限度地减少柱外体积(ECV)，从而实现1.5MM内径色谱柱的最佳性能。

- 一般来说，使用长度最短、内径最小的管路来适应您的LC系统。
- 您是运行等度还是梯度？
  - 如果运行等度，那么调整柱前管是最有效的，可以减少柱前管的长度和内径。
  - 如果运行梯度，那么调整柱后管是最有效的，可以减少柱后管的长度和内径。
- 您的系统是否有热交换器？如果有，只要您的方法能够在没有它的情况下运行，可以考虑绕过它。
- 您的系统是否有更小体积的流通池？如果有，可以考虑改用它。

选择连接管的步骤

1. 测量从进样器到色谱柱、从色谱柱到检测器或质谱源的长度（mm）。
2. 根据下表选择合适的管路内径和长度，并注意系统的压力限制。

L(mm)	ID (µm)	volume (uL)	
150	25	0.07	
	50	0.29	
	75	0.66	
	100	1.18	

L(mm)	ID (µm)	volume (uL)	
350	25	0.17	
	50	0.69	
	75	1.55	
	100	2.75	

L(mm)	ID (µm)	volume (uL)	
600	25	0.29	
	50	1.18	
	75	2.65	
	100	4.71	

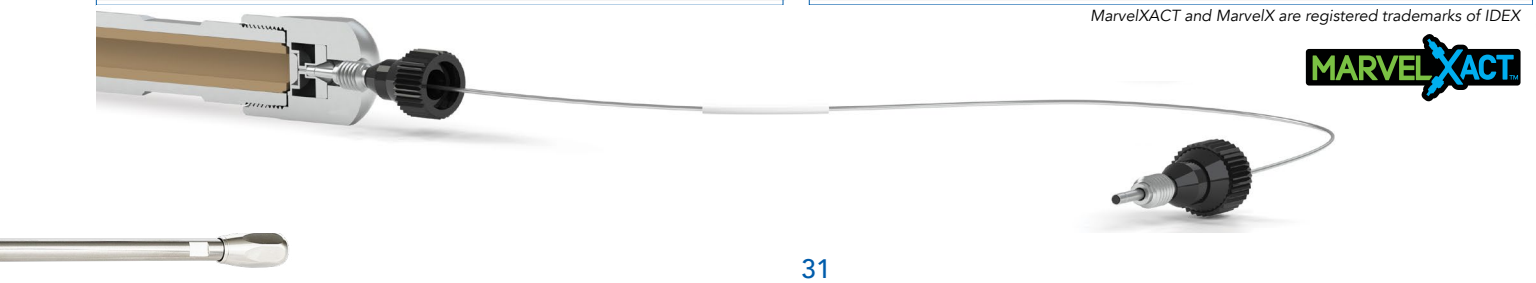
Green = minimal extra back pressure (<15 bar)
Orange = may generate too much back pressure (>40 bar)
Red = not recommended (>100 bar)

AMT MARVEL XACT™ PEEK LINED STAINLESS TUBING

DESCRIPTION	VOLUME	PART NUMBER
AMT MarvelXACT™ PLS 25µm x 150mm	75 nl	PL7025150
AMT MarvelXACT™ PLS 25µm x 350mm	170 nl	PL7025350
AMT MarvelXACT™ PLS 25µm x 600mm	295 nl	PL7025600
AMT MarvelXACT™ PLS 50µm x 150mm	295 nl	PL7050150
AMT MarvelXACT™ PLS 50µm x 350mm	685 nl	PL7050350
AMT MarvelXACT™ PLS 50µm x 600mm	1178 nl	PL7050600
AMT MarvelXACT™ PLS 75µm x 150mm	665 nl	PL7075150
AMT MarvelXACT™ PLS 75µm x 350mm	1545 nl	PL7075350
AMT MarvelXACT™ PLS 75µm x 600mm	2650 nl	PL7075600
AMT MarvelXACT™ PLS 100µm x 150mm	1178 nl	PL7100150
AMT MarvelXACT™ PLS 100µm x 350mm	2750 nl	PL7100350
AMT MarvelXACT™ PLS 100µm x 600mm	4710 nl	PL7100600

AMT MARVEL XACT™ PEEKSIL™ TUBING

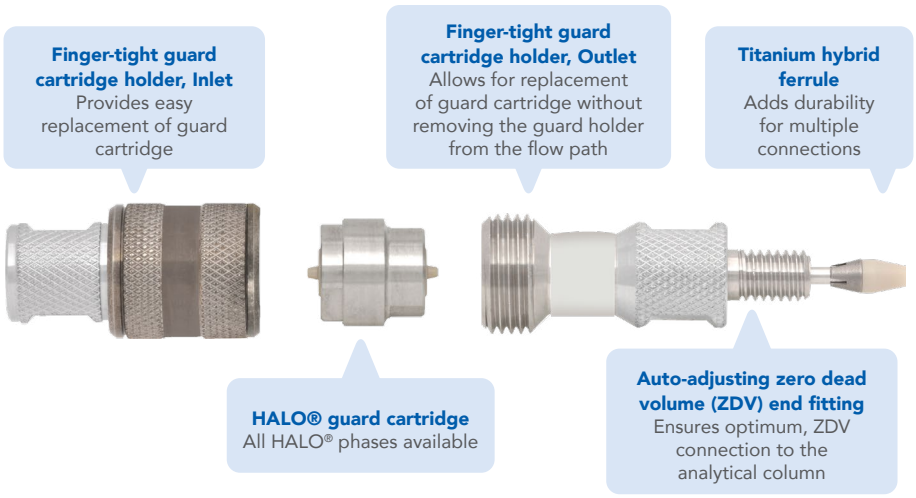
DESCRIPTION	VOLUME	PART NUMBER
AMT MarvelXACT™ PEEKsil™ 25µm ID x 150mm	75 nl	PS7025150
AMT MarvelXACT™ PEEKsil™ 25µm ID x 350mm	170 nl	PS7025350
AMT MarvelXACT™ PEEKsil™ 25µm ID x 600mm	295 nl	PS7025600
AMT MarvelXACT™ PEEKsil™ 50µm ID x 150mm	295 nl	PS7050150
AMT MarvelXACT™ PEEKsil™ 50µm ID x 350mm	685 nl	PS7050350
AMT MarvelXACT™ PEEKsil™ 50µm ID x 600mm	1178 nl	PS7050600
AMT MarvelXACT™ PEEKsil™ 75µm ID x 150mm	665 nl	PS7075150
AMT MarvelXACT™ PEEKsil™ 75µm ID x 350mm	1545 nl	PS7075350
AMT MarvelXACT™ PEEKsil™ 75µm ID x 600mm	2650 nl	PS7075600
AMT MarvelXACT™ PEEKsil™ 100µm ID x 150mm	1178 nl	PS7100150
AMT MarvelXACT™ PEEKsil™ 100µm ID x 350mm	2750 nl	PS7100350
AMT MarvelXACT™ PEEKsil™ 100µm ID x 600mm	4710 nl	PS7100600



HALO® UHPLC和HPLC保护柱

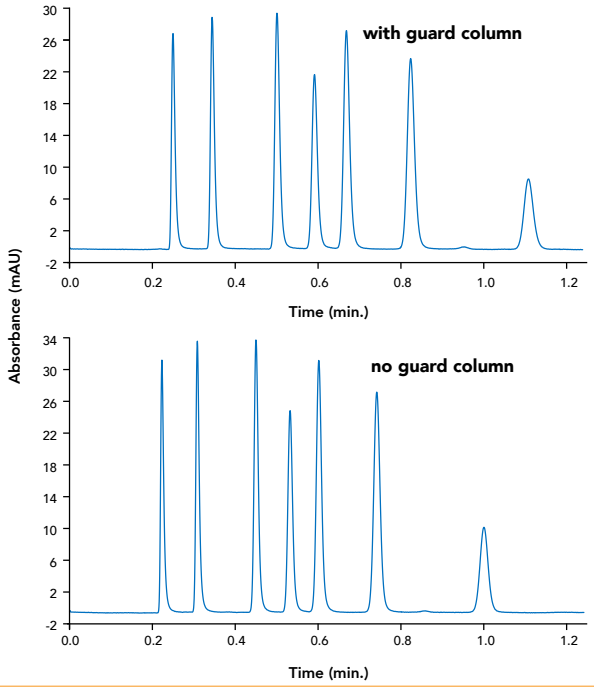
- ✓ 拦截样品中强保留化合物，从而使色谱柱污染降到最低。
- ✓ 极低扩散、使用方便，耐压达1000 bar。
- ✓ 手紧、直连，并且自动调整适应任何10–32螺丝的色谱柱。
- ✓ 无需从流路中移除保护柱卡套，便可轻松更换保护柱芯。
- ✓ 可用于HALO®各种规格(内径2.1、3.0和4.6mm)和固定相的色谱柱。

HALO®保护柱套和柱芯的分解图



HALO®保护柱：保护+保持色谱柱性能

HALO®保护柱为您的HALO® HPLC和UHPLC色谱柱提供最佳保护，且不会降低色谱柱柱效。



TEST CONDITIONS:

Column: HALO 90 Å C18, 2.7 µm, 4.6 x 50 mm
Mobile Phase: 60/40 ACN/water
Flow Rate: 1.8 mL/min.
Temperature: 30 ˚C
Detection: 254 nm
Injection Volume: 1 µL
Pressure: 158 bar with guard column
146 bar without guard column
Instrument:
Optimized Agilent 1100, bypassed semi-micro flow cell
0.05" ID tubing
14 Hz data rate

The Optimize Technologies EXP® Direct Connect Holder: U.S. Patent No. 8,201,854 & 8,696,902 and Foreign Patents Pending.

新型表面钝化硬件–提高寿命和稳定性

在快节奏的分析世界中，经常会需要使用生物惰性的流路来应对复杂且高活性的样品。
现在的LC系统可以通过一系列特殊材料实现生物惰性，但它们比不锈钢流路的仪器要贵许多。
建议使用表面钝化的HALO® 硬件来处理可能与金属螯合的磷酸化合物和分析物。
与未涂覆的硬件相比，该硬件可以改善峰形，提高回收率。某些情况下，在观察到信号之前，需要对未涂覆的硬件进行活化处理。使用HALO®表面钝化的硬件，不需要对色谱柱进行预处理。

HPLC色谱柱使用表面钝化的益处：

提供更高的性能

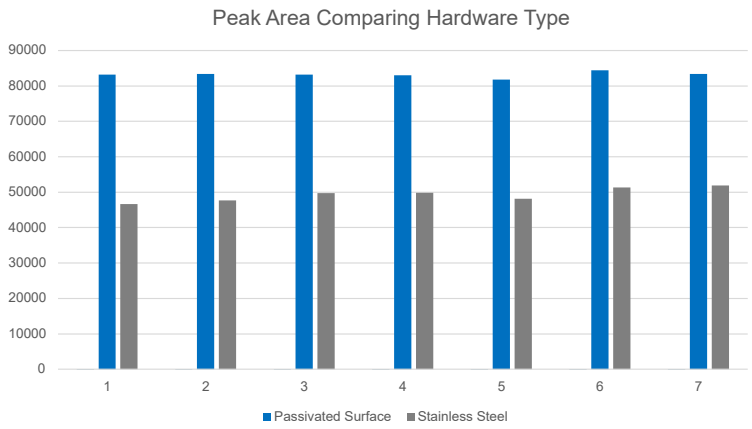
- ✓ 使用无金属离子的生物惰性流路，尽量减少不必要的相互作用。
- ✓ 改善其他方法无法处理的筛板的生物惰性。
- ✓ 提高化学兼容性，即使是苛刻溶剂，比如对PEEK材料极具挑战性的THF。

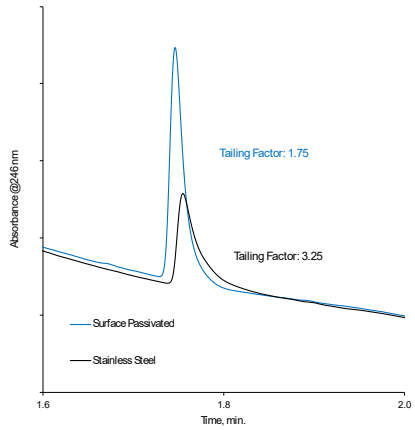
提供更高的可靠性

- ✓ 耐用性提高-无开裂或者脱落，耐磨性是304不锈钢的两倍。
- ✓ 耐腐蚀性更好。
- ✓ 与玻璃相比，惰性更高。

使用表面钝化的硬件改善峰面积和形状

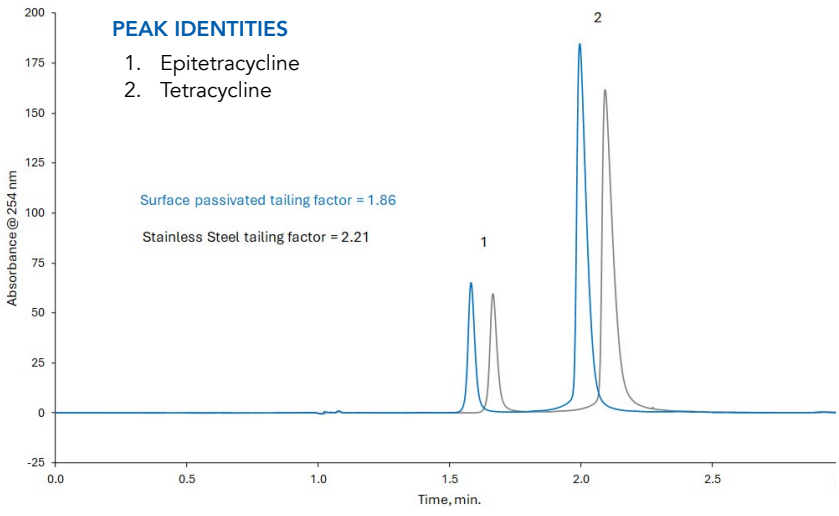
表面钝化的硬件能够改善具有金属吸附特性的化合物的回收率，如螯合剂、磷酸化合物和生物分子。
该图显示，与标准不锈钢硬件相比，使用表面钝化的硬件，氢化可的松磷酸钠的峰面积平均增加了40%，拖尾因子降低了40%。

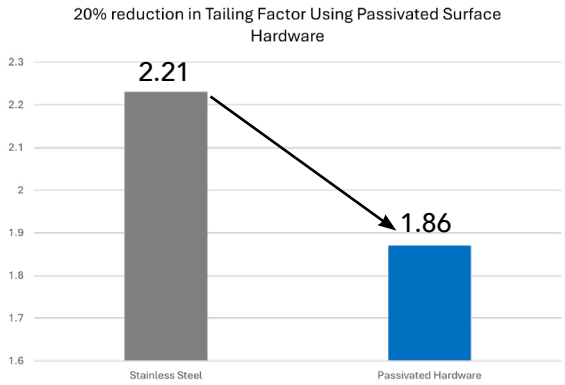




表面钝化硬件消除四环素的非特异性吸附

四环素的分析中可以观察到拖尾因子降低了。
使用表面钝化的硬件，可以最大限度地减少不必要的金属吸附，从而不需要老化色谱柱。





TEST CONDITIONS:

Columns: HALO 90 Å C18, 2.7 µm, 4.6 x 150 mm; stainless steel
HALO 90 Å C18, 2.7 µm, 4.6 x 150 mm; surface passivated
Mobile Phase A: water/0.1% formic acid
Mobile Phase B: methanol
Isocratic: 30% B
Flow Rate: 1.3 mL/min
Temperature: 35 °C
Detection: UV 254 nm, PDA

Injection Volume: 5 µL of a 0.2 mg/mL sample of tetracycline
Sample Solvent: water/0.1% formic acid
Data Rate: 40 Hz
Response Time: 0.05 s
Flow Cell: 1 µL
LC System: Nexera X2

产品特点

SMALL MOLECULE

Bonded Phase	C18	LPH-C18	Elevate C18	PCS C18	AQ-C18	C8
USP Designation	L1	L1	L1	L1	L1	L7
Particle Size(s) (µm)	2 2.7 5	2 2.7	2.7	2.7	2 2.7 5	2 2.7 5
Pore Size (Å)	90	90	120	90	90	90
Carbon Load (%)	7.2 7.7 6.4	6.5	5.6	7.4	6.5 6.7 5.6	4.8 5.4 3.7
Surface Area (m^2/g)	125 125 90	125 125	75	125	125 125 90	125 125 90
Low pH Limit	2	1	2	2	2	2
High pH Limit	9	8	12	7	9	9
Temp Limit @ Low pH	60 °C	90 °C	60 °C	60 °C	60 °C	60 °C
Temp Limit @ High pH	40 °C	40 °C	60 °C	40 °C	40 °C	40 °C
Endcapped	Yes	No	Yes	Yes	Yes	Yes

HILIC PHASES

Bonded Phase	HILIC	Penta-HILIC
USP Designation	L60	L95
Particle Size(s) (µm)	2 2.7 5	2 2.7 5
Pore Size (Å)	90	90
Carbon Load (%)	unbonded	2.8 3.2 2.1
Surface Area (m^2/g)	125 125 90	125 125 90
Low pH Limit	1	2
High pH Limit	8	9
Temp Limit @ Low pH	60 °C	60 °C
Temp Limit @ High pH	40 °C	40 °C
Endcapped	N/A	No

ENVIROCLASS

Bonded Phase	PFAS	PFAS Delay	PAH
Particle Size(s) (µm)	2.7	2.7	2.7
Surface Area (m^2/g)	125	-	125
Low pH Limit	2	2	2
High pH Limit	9	9	9
Temp Limit @ Low pH	60 °C	60 °C	60 °C
Temp Limit @ High pH	40 °C	40 °C	40 °C
Endcapped	Yes	Yes	No

Column lifetime will vary depending on the operating temperature and the type and concentration of buffers used. Operation at extreme specifications of temperature and pH may reduce column lifetime. Consult the column Care and Use for more information.

Phenyl-Hexyl	PCS Phenyl-Hexyl	ES-CN	Biphenyl	PFP	RP-Amide	C30
L11	L11	L10	L11	L43	L60	L62
2 2.7 5	2.7	2 2.7 5	2 2.7 5	2 2.7 5	2 2.7 5	2.7
90	90	90	90	90	90	160
6.3 7.1 5.2	6.1	3.4 3.5 2.5	6.7 7.0 5.5	5.3 5.5 3.9	7.3 8.2 5.1	4.5
125 125 90	125	125 125 90	125 125 90	125 125 90	125 125 90	75
2	2	1	2	2	2	2
9	7	8	9	8	9	9
60 °C	60 °C	80 °C	60 °C	60 °C	60 °C	60 °C
40 °C	40 °C	40 °C	40 °C	40 °C	40 °C	40 °C
Yes	Yes	Yes	Yes	Yes	Yes	Yes

BIOCLASS

	PROTEIN			OLIGO	PEPTIDE				GLYCAN
Bonded Phase	**C4**	**ES-C18**	**Diphenyl**	**C18**	**ES-C18**	**ES-CN**	**PHENYL-HEXYL**	**PCS C18**	**Proprietary Poly-Hydroxy**
USP Designation	L26	L1	L11	L1	L1	L10	L11	L1	L95
Particle Size(s) (µm)	2.7 3.4	2.7 3.4	2.7 3.4	2.7	2 2.7 5	2.7 5	2.7	2.7	2.7
Pore Size (Å)	1000 400	1000 400	1000 400	120	160	160	160	160	90
Carbon Load (%)	0.6 0.4	1.4 1.0	1.0 0.7	5.6	4.0 4.6 4.0	2.2 1.5	4.7	5.09	3.2
Surface Area (m^2/g)	22 15	22 15	22 15	75	68 75 60	75 60	75	90	125
Low pH Limit	2	1	2	2	1	1/	2	2	2
High pH Limit	9	8	9	9	8	8	9	7	9
Temp Limit @ Low pH	90 °C	90 °C	90 °C	90 °C	90 °C	90°C	90 °C	90 °C	65 °C
Temp Limit @ High pH	40 °C	40 °C	40 °C	85 °C	40 °C	40 °C	40 °C	40 °C	40 °C
Endcapped	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No

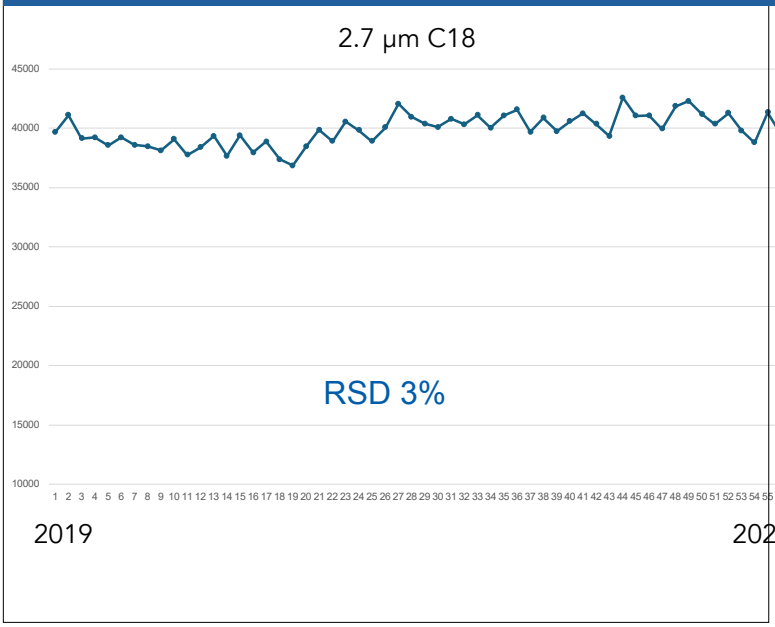
质量承诺

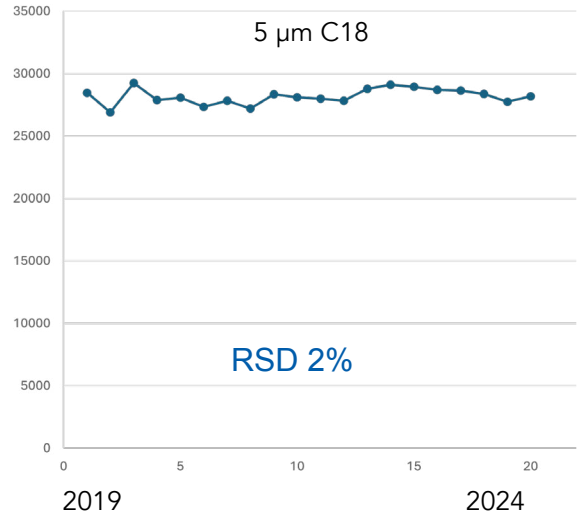
自2005年成立以来，Advanced Materials Technology公司一直专注于一个使命——改善样品在检测器上的展现。使用独特的Fused-Core®颗粒设计，我们挑战传统技术，并为分离提供了创新型的解决方案。我们严格的质量程序及实践被融合到每一根HALO®色谱柱，以确保您每一次的成功！

HALO®色谱柱5年QC的重现性数据

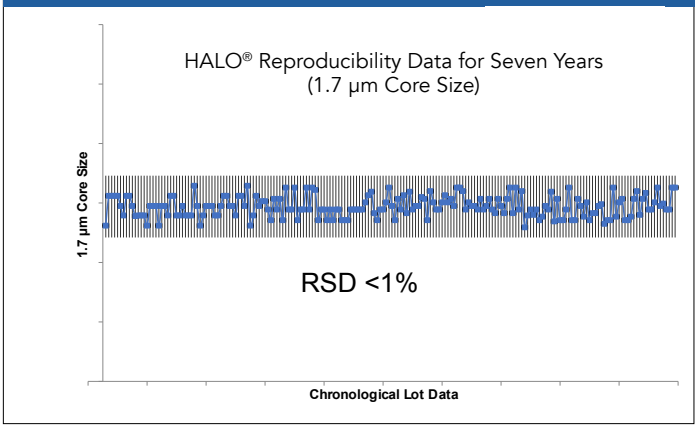
2.7um 和5um C18产品线，单个色谱柱平均塔板数的QC数据已按硅胶批次绘制。

两条主要产品线，大于4000支色谱柱的出厂质量数据按填料批次平均，由此可以看出过去5年中卓越的重现性。



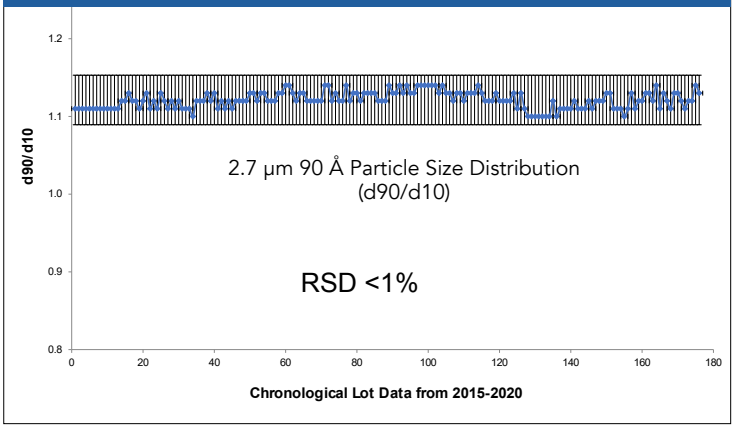


固体二氧化硅实心核是HALO® Fused-Core®颗粒的基础。在这张过去7年的记录图中，我们代表性的2.7µm颗粒的实心核的RSD<1%，这是很让人敬佩的。



AMT对粒度分布的严格要求（RSD<1%），突出了我们在生产过程中严格的质量控制。

集中的粒径分布确保了色谱柱的高柱效。

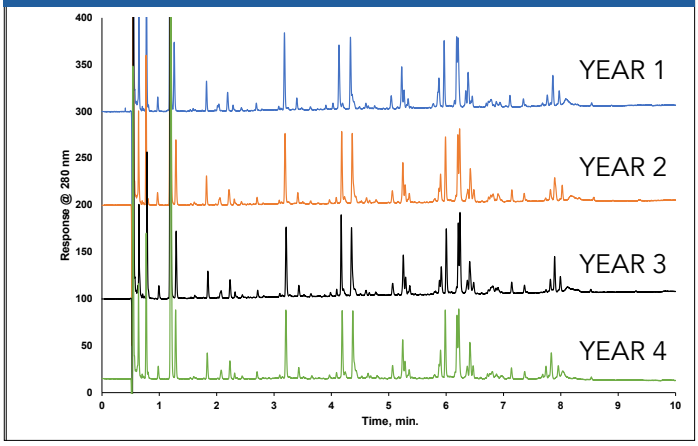


值得信赖的创新 – 您可以信赖的性能

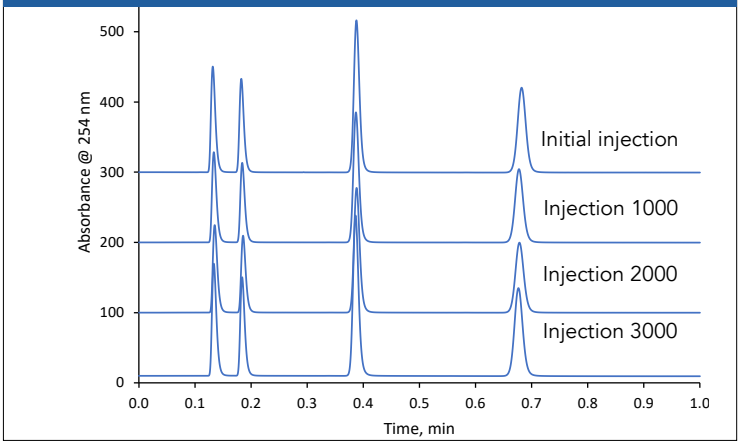
AMT产品的质量源于我们对制造过程的完全控制。从进入的原材料到最终的颗粒，再到装填、包装，质量控制渗透入每一个环节。实心核和壳层都经过严格的控制，以达到紧密的粒径分布，从而优化装填参数，最终生产出高性能的色谱柱。每一批次的产品都经过严格的质量保证测试。

该结果极大地实现了我们对AMT色谱柱具有长期重现性的客户承诺。

多年和多批次的HALO® Peptide ES-C18色谱柱分离阿达木单抗消化物的比较。请注意，多年和多批次出色的分离重现性，代表了AMT公司给您提供值得信赖的质量的承诺。



所有新推出的HALO®产品都经过稳定性测试。在本例中，测试需要在高温条件下至少1000次进样，以证明其重复性和性能。如图所示，在进样3000针（大约23000个柱体积）时，峰形和保留没有明显变化。



"The HALO® C18 is the most rugged columns I have ever found. We routinely acheive more than 8,000 injections per column."
- High Througouput Development and Bioanlaysis Customer

ADVANCED MATERIALS TECHNOLOGY IS AN ISO 9001:2015 CERTIFIED COMPANY

HALO 90 Å 2.7 µm COLUMNS

Dimensions ID x L (in mm)	C18	AQ-C18	LPH-C18	PCS C18	Elevate C18**	C8	C30*	Biphenyl	RP-Amide
0.3 x 50	98216-402	98216-422				98216-408	91216-402	98216-411	98216-407
0.3 x 100	98216-602	98216-622				98216-608	91216-602	98216-611	98216-607
0.3 x 150	98216-702	98216-722				98216-708	91216-702	98216-711	98216-707
0.5 x 50	98215-402	98215-422				98215-408	91215-402	98215-411	98215-407
0.5 x 100	98215-602	98215-622				98215-608	91215-602	98215-611	98215-607
0.5 x 150	98215-702	98215-722				98215-708	91215-702	98215-711	98215-707
1.0 x 50	92811-402	92811-422				92811-408	92111-402	92811-411	92811-407
1.0 x 100	92811-602	92811-622				92811-608	92111-602	92811-611	92811-607
1.0 x 150	92811-702	92811-722				92811-708	92111-702	92811-711	92811-707
1.5 x 50	9281X-402	9281X-422	9282X-416	9281X-417	9227X-402				
1.5 x 100	9281X-602	9281X-622	9282X-616	9281X-617	9227X-602				
1.5 x 150	9281X-702	9281X-722	9282X-716	9281X-717	9227X-702				
2.1 x 20	92812-202	92812-222				92812-208	92112-230	92812-211	92812-207
2.1 x 30	92812-302	92812-322		92812-317	92272-302	92812-308	92112-330	92812-311	92812-307
2.1 x 50	92812-402	92812-422	92822-416	92812-417	92272-402	92812-408	92112-430	92812-411	92812-407
2.1 x 75	92812-502	92812-522				92812-508	92112-530	92812-511	92812-507
2.1 x 100	92812-602	92812-622	92822-616	92812-617	92272-602	92812-608	92112-630	92812-611	92812-607
2.1 x 150	92812-702	92812-722	92822-716	92812-717	92272-702	92812-708	92112-730	92812-711	92812-707
2.1 x 250	92812-902	92812-922			92272-902	92812-908	92112-930	92812-911	92812-907
3.0 x 20	92813-202	92813-222				92813-208	92113-230	92813-211	92813-207
3.0 x 30	92813-302	92813-322		92813-317	92273-302	92813-308	92113-330	92813-311	92813-307
3.0 x 50	92813-402	92813-422	92823-416	92813-417	92273-402	92813-408	92113-430	92813-411	92813-407
3.0 x 75	92813-502	92813-522				92813-508	92113-530	92813-511	92813-507
3.0 x 100	92813-602	92813-622	92823-616	92813-617	92273-602	92813-608	92113-630	92813-611	92813-607
3.0 x 150	92813-702	92813-722	92823-716	92813-717	92273-702	92813-708	92113-730	92813-711	92813-707
3.0 x 250	92813-902	92813-922				92813-908	92113-930	92813-911	92813-907
4.6 x 20	92814-202	92814-222				92814-208	92114-230	92814-211	92814-207
4.6 x 30	92814-302	92814-322				92814-308	92114-330	92814-311	92814-307
4.6 x 50	92814-402	92814-422	92824-416	92814-417	92274-402	92814-408	92114-430	92814-411	92814-407
4.6 x 75	92814-502	92814-522				92814-508	92114-530	92814-511	92814-507
4.6 x 100	92814-602	92814-622	92824-616	92814-617	92274-602	92814-608	92114-630	92814-611	92814-607
4.6 x 150	92814-702	92814-722	92824-716	92814-717	92274-702	92814-708	92114-730	92814-711	92814-707
4.6 x 250	92814-902	92814-922		92814-917	92274-902	92814-908	92114-930	92814-911	92814-907
10.0 x 50	92810-402	92810-422				92810-408	92110-402	92810-411	92810-407
10.0 x 100	92810-602	92810-622				92810-608	92110-602	92810-611	92810-607
10.0 x 150	92810-702	92810-722				92810-708	92110-702	92810-711	92810-707
2.7 µm, 90 Å Guard Columns, 3-Pack									
Dimensions ID x Length (in mm)	C18	AQ-C18	LPH-C18	PCS C18	Elevate C18	C8	C30	Biphenyl	RP-Amide
2.1 x 5	92812-102	92812-122	92822-116	92812-117	92272-102	92812-108	92112-130	92812-111	92812-107
3.0 x 5	92813-102	92813-122	92823-116	92813-117	92273-102	92813-108	92113-130	92813-111	92813-107
4.6 x 5	92814-102	92814-122	92824-116	92814-117	92274-102	92814-108	92114-130	92814-111	92814-107
Guard Column Holder 94900-001									

查询未列出的色谱柱？如需定制色谱柱，请联系我们。

HALO® ENVIROCLASS COLUMNS

Dimensions ID x L (in mm)	Phenyl-Hexyl	PCS Phenyl-Hexyl	PFP	ES-CN	Penta-HILIC	HILIC	PFAS	PFAS Delay	PAH
0.3 x 50	98216-406		98216-409	98216-404	98216-405	98216-401			
0.3 x 100	98216-606		98216-609	98216-604	98216-605	98216-601			
0.3 x 150	98216-706		98216-709	98216-704	98216-705	98216-701			
0.5 x 50	98215-406		98215-409	98215-404	98215-405	98215-401			
0.5 x 100	98215-606		98215-609	98215-604	98215-605	98215-601			
0.5 x 150	98215-706		98215-709	98215-704	98215-705	98215-701			
1.0 x 50	92811-406		92811-409	92811-404	92811-405	92811-401			
1.0 x 100	92811-606		92811-609	92811-604	92811-605	92811-601			
1.0 x 150	92811-706		92811-709	92811-704	92811-705	92811-701			
1.5 x 50		9281X-418			9281X-405				
1.5 x 100		9281X-618			9281X-605				
1.5 x 150		9281X-718			9281X-705				
2.1 x 20	92812-206		92812-209	92812-204	92812-205	92812-201			
2.1 x 30	92812-306		92812-309	92812-304	92812-305	92812-301			
2.1 x 50	92812-406	92812-418	92812-409	92812-404	92812-405	92812-401	92812-413		92842-412
2.1 x 75	92812-506		92812-509	92812-504	92812-505	92812-501			
2.1 x 100	92812-606	92812-618	92812-609	92812-604	92812-605	92812-601	92812-613		92842-612
2.1 x 150	92812-706	92812-718	92812-709	92812-704	92812-705	92812-701	92812-713		92842-712
2.1 x 250	92812-906		92812-909	92812-904	92812-905	92812-901	92812-913		
3.0 x 20	92813-206		92813-209	92813-204	92813-205	92813-201			
3.0 x 30	92813-306		92813-309	92813-304	92813-305	92813-301			
3.0 x 50	92813-406	92813-418	92813-409	92813-404	92813-405	92813-401	92813-413	92113-415	92843-412
3.0 x 75	92813-506		92813-509	92813-504	92813-505	92813-501			
3.0 x 100	92813-606	92813-618	92813-609	92813-604	92813-605	92813-601	92813-613		92843-612
3.0 x 150	92813-706	92813-718	92813-709	92813-704	92813-705	92813-701	92813-713		92843-712
3.0 x 250	92813-906		92813-909	92813-904	92813-905	92813-901	92813-913		
4.6 x 20	92814-206		92814-209	92814-204	92814-205	92814-201			
4.6 x 30	92814-306		92814-309	92814-304	92814-305	92814-301			
4.6 x 50	92814-406	92814-418	92814-409	92814-404	92814-405	92814-401		92114-415	92844-412
4.6 x 75	92814-506		92814-509	92814-504	92814-505	92814-501			
4.6 x 100	92814-606	92814-618	92814-609	92814-604	92814-605	92814-601			92844-612
4.6 x 150	92814-706	92814-718	92814-709	92814-704	92814-705	92814-701			92844-712
4.6 x 250	92814-906	92814-918	92814-909	92814-904	92814-905	92814-901			92844-912
10.0 x 50	92810-406		92810-409	92810-404	92810-405	92810-401			
10.0 x 100	92810-606		92810-609	92810-604	92810-605	92810-601			
10.0 x 150	92810-706		92810-709	92810-704	92810-705	92810-701			
2.7 µm, 90 Å Guard Columns, 3-Pack									
Dimensions ID x Length (in mm)	Phenyl-Hexyl	PCS Phenyl-Hexyl	PFP	ES-CN	Penta-HILIC	HILIC			PAH
2.1 x 5	92812-106	92812-118	92812-109	92812-104	92812-105	92812-101			92842-112
3.0 x 5	92813-106	92813-118	92813-109	92813-104	92813-105	92813-101			92843-112
4.6 x 5	92814-106	92814-118	92814-109	92814-104	92814-105	92814-101			92844-112
Guard Column Holder 94900-001									

*HALO® C30 pore size = 160 Å

**HALO® Elevate C18 pore size = 120 Å

HALO 90 Å 2 µm COLUMNS

Dimensions ID x Length (in mm)	C18	AQ-C18	LPH-C18	C8	Elevate	Biphenyl	Phenyl-Hexyl	RP-Amide	PFP	ES-CN	Penta-HILIC	HILIC
2.1 x 20	91812-202	91812-222		91812-208	91272-202	91812-211	91812-206	91812-207	91812-209	91812-204	91812-205	91812-201
2.1 x 30	91812-302	91812-322		91812-308	91272-302	91812-311	91812-306	91812-307	91812-309	91812-304	91812-305	91812-301
2.1 x 50	91812-402	91812-422	91822-416	91812-408	91272-402	91812-411	91812-406	91812-407	91812-409	91812-404	91812-405	91812-401
2.1 x 75	91812-502	91812-522		91812-508		91812-511	91812-506	91812-507	91812-509	91812-504	91812-505	91812-501
2.1 x 100	91812-602	91812-622	91822-616	91812-608	91272-602	91812-611	91812-606	91812-607	91812-609	91812-604	91812-605	91812-601
2.1 x 150	91812-702	91812-722	91822-716	91812-708	91272-702	91812-711	91812-706	91812-707	91812-709	91812-704	91812-705	91812-701
2.1 x 250	91812-902	91812-922		91812-908	91272-902	91812-911	91812-906	91812-907	91812-909	91812-904	91812-905	91812-901
3.0 x 20	91813-202	91813-222		91813-208		91813-211	91813-206	91813-207	91813-209	91813-204	91813-205	91813-201
3.0 x 30	91813-302	91813-322		91813-308	91273-302	91813-311	91813-306	91813-307	91813-309	91813-304	91813-305	91813-301
3.0 x 50	91813-402	91813-422	91823-416	91813-408	91273-402	91813-411	91813-406	91813-407	91813-409	91813-404	91813-405	91813-401
3.0 x 75	91813-502	91813-522		91813-508		91813-511	91813-506	91813-507	91813-509	91813-504	91813-505	91813-501
3.0 x 100	91813-602	91813-622	91823-616	91813-608	91273-602	91813-611	91813-606	91813-607	91813-609	91813-604	91813-605	91813-601
3.0 x 150	91813-702	91813-722	91823-716	91813-708	91273-702	91813-711	91813-706	91813-707	91813-709	91813-704	91813-705	91813-701
3.0 x 250	91813-902	91813-922		91813-908		91813-911	91813-906	91813-907	91813-909	91813-904	91813-905	91813-901

2 µm, 90 Å Guard Columns, 3-Pack

Dimensions ID x Length (in mm)	C18	AQ-C18	LPH-C18	C8		Biphenyl	Phenyl-Hexyl	RP-Amide	PFP	ES-CN	Penta-HILIC	HILIC
2.1 x 5	91812-102	91812-122	91822-116	91812-108		91812-111	91812-106	91812-107	91812-109	91812-104	91812-105	91812-101
3.0 x 5	91813-102	91813-122	91823-116	91813-108		91813-111	91813-106	91813-107	91813-109	91813-104	91813-105	91813-101

HALO 90 Å 5 µm COLUMNS

Dimensions ID x Length (in mm)	C18	AQ-C18	C8	Biphenyl	Phenyl-Hexyl	RP-Amide	PFP	ES-CN	Penta-HILIC	HILIC
2.1 x 20	95812-202	95812-222	95812-208	95812-211	95812-206	95812-207	95812-209	95812-204	95812-205	95812-201
2.1 x 30	95812-302	95812-322	95812-308	95812-311	95812-306	95812-307	95812-309	95812-304	95812-305	95812-301
2.1 x 50	95812-402	95812-422	95812-408	95812-411	95812-406	95812-407	95812-409	95812-404	95812-405	95812-401
2.1 x 75	95812-502	95812-522	95812-508	95812-511	95812-506	95812-507	95812-509	95812-504	95812-505	95812-501
2.1 x 100	95812-602	95812-622	95812-608	95812-611	95812-606	95812-607	95812-609	95812-604	95812-605	95812-601
2.1 x 150	95812-702	95812-722	95812-708	95812-711	95812-706	95812-707	95812-709	95812-704	95812-705	95812-701
2.1 x 250	95812-902	95812-922	95812-908	95812-911	95812-906	95812-907	95812-909	95812-904	95812-905	95812-901
3.0 x 20	95813-202	95813-222	95813-208	95813-211	95813-206	95813-207	95813-209	95813-204	95813-205	95813-201
3.0 x 30	95813-302	95813-322	95813-308	95813-311	95813-306	95813-307	95813-309	95813-304	95813-305	95813-301
3.0 x 50	95813-402	95813-422	95813-408	95813-411	95813-406	95813-407	95813-409	95813-404	95813-405	95813-401
3.0 x 75	95813-502	95813-522	95813-508	95813-511	95813-506	95813-507	95813-509	95813-504	95813-505	95813-501
3.0 x 100	95813-602	95813-622	95813-608	95813-611	95813-606	95813-607	95813-609	95813-604	95813-605	95813-601
3.0 x 150	95813-702	95813-722	95813-708	95813-711	95813-706	95813-707	95813-709	95813-704	95813-705	95813-701
3.0 x 250	95813-902	95813-922	95813-908	95813-911	95813-906	95813-907	95813-909	95813-904	95813-905	95813-901
4.6 x 20	95814-202	95814-222	95814-208	95814-211	95814-206	95814-207	95814-209	95814-204	95814-205	95814-201
4.6 x 30	95814-302	95814-322	95814-308	95814-311	95814-306	95814-307	95814-309	95814-304	95814-305	95814-301
4.6 x 50	95814-402	95814-422	95814-408	95814-411	95814-406	95814-407	95814-409	95814-404	95814-405	95814-401
4.6 x 75	95814-502	95814-522	95814-508	95814-511	95814-506	95814-507	95814-509	95814-504	95814-505	95814-501
4.6 x 100	95814-602	95814-622	95814-608	95814-611	95814-606	95814-607	95814-609	95814-604	95814-605	95814-601
4.6 x 150	95814-702	95814-722	95814-708	95814-711	95814-706	95814-707	95814-709	95814-704	95814-705	95814-701
4.6 x 250	95814-902	95814-922	95814-908	95814-911	95814-906	95814-907	95814-909	95814-904	95814-905	95814-901
10.0 x 50	95810-402	95810-422	95810-408	95810-411	95810-406	95810-407	95810-409	95810-404	95810-405	95810-401
10.0 x 100	95810-602	95810-622	95810-608	95810-611	95810-606	95810-607	95810-609	95810-604	95810-605	95810-601
10.0 x 150	95810-702	95810-722	95810-708	95810-711	95810-706	95810-707	95810-709	95810-704	95810-705	95810-701
10.0 x 250	95810-902	95810-922	95810-908	95810-911	95810-906	95810-907	95810-909	95810-904	95810-905	95810-901

5 µm, 90 Å Guard Columns, 3-Pack

Dimensions ID x Length (in mm)	C18	AQ-C18	C8	Biphenyl	Phenyl-Hexyl	RP-Amide	PFP	ES-CN	Penta-HILIC	HILIC
2.1 x 5	95812-102	95812-122	95812-108	95812-111	95812-106	95812-107	95812-109	95812-104	95812-105	95812-101
3.0 x 5	95813-102	95813-122	95813-108	95813-111	95813-106	95813-107	95813-109	95813-104	95813-105	95813-101
4.6 x 5	95814-102	95814-122	95814-108	95814-111	95814-106	95814-107	95814-109	95814-104	95814-105	95814-101

Guard Column Holder 94900-001

HALO 1000 Å & 400 Å PROTEIN COLUMNS

Part numbers for capillary, analytical and semi-preparative HALO 1000 and 400 Å in 2.7 and 3.4 µm phases are provided below. Guard columns are available in 2.1, 3.0 and 4.6 mm IDs for UHPLC and HPLC applications to provide additional column protection when desired.

	400 Å, 3.4 µm			1000 Å, 2.7 µm		
Dimensions ID x Length (in mm)	C4	ES-C18	Diphenyl	C4	ES-C18	Diphenyl
0.3 x 50	94316-414	94316-402	94316-426	97216-414	97216-402	97216-426
0.3 x 100	94316-614	94316-602	94316-626	97216-614	97216-602	97216-626
0.3 x 150	94316-714	94316-702	94316-726	97216-714	97216-702	97216-726
0.5 x 50	94315-414	94315-402	94315-426	97215-414	97215-402	97215-426
0.5 x 100	94315-614	94315-602	94315-626	97215-614	97215-602	97215-626
0.5 x 150	94315-714	94315-702	94315-726	97215-714	97215-702	97215-726
1.0 x 50	93411-414	93411-402	93411-426	92711-414	92711-402	92711-426
1.0 x 100	93411-614	93411-602	93411-626	92711-614	92711-602	92711-626
1.0 x 150	93411-714	93411-702	93411-726	92711-714	92711-702	92711-726
1.5 x 50				9271X-414		9271X-426
1.5 x 100				9271X-614		9271X-626
1.5 x 150				9271X-714		9271X-726
2.1 x 20	93412-214	93412-202	93412-226	92712-214	92712-202	92712-226
2.1 x 30	93412-314	93412-302	93412-326	92712-314	92712-302	92712-326
2.1 x 50	93412-414	93412-402	93412-426	92712-414	92712-402	92712-426
2.1 x 75	93412-514	93412-502	93412-526	92712-514	92712-502	92712-526
2.1 x 100	93412-614	93412-602	93412-626	92712-614	92712-602	92712-626
2.1 x 150	93412-714	93412-702	93412-726	92712-714	92712-702	92712-726
2.1 x 250	93412-914	93412-902	93412-926	92712-914	92712-902	92712-926
3.0 x 20	93413-214	93413-202	93413-226	92713-214	92713-202	92713-226
3.0 x 30	93413-314	93413-302	93413-326	92713-314	92713-302	92713-326
3.0 x 50	93413-414	93413-402	93413-426	92713-414	92713-402	92713-426
3.0 x 75	93413-514	93413-502	93413-526	92713-514	92713-502	92713-526
3.0 x 100	93413-614	93413-602	93413-626	92713-614	92713-602	92713-626
3.0 x 150	93413-714	93413-702	93413-726	92713-714	92713-702	92713-726
3.0 x 250	93413-914	93413-902	93413-926	92713-914	92713-902	92713-926
4.6 x 20	93414-214	93414-202	93414-226	92714-214	92714-202	92714-226
4.6 x 30	93414-314	93414-302	93414-326	92714-314	92714-302	92714-326
4.6 x 50	93414-414	93414-402	93414-426	92714-414	92714-402	92714-426
4.6 x 75	93414-514	93414-502	93414-526	92714-514	92714-502	92714-526
4.6 x 100	93414-614	93414-602	93414-626	92714-614	92714-602	92714-626
4.6 x 150	93414-714	93414-702	93414-726	92714-714	92714-702	92714-726
4.6 x 250	93414-914	93414-902	93414-926	92714-914	92714-902	92714-926
10.0 x 50	93410-414	93410-402	93410-426	92710-414	92710-402	92710-426
10.0 x 100	93410-614	93410-602	93410-626	92710-614	92710-602	92710-626
10.0 x 150	93410-714	93410-702	93410-726	92710-714	92710-702	92710-726
Guard Columns, 3-Pack						
Dimensions ID x Length (in mm)	C4	ES-C18	Diphenyl	C4	ES-C18	Diphenyl
2.1 x 5	93412-114	93412-102	93412-126	92712-114	92712-102	92712-126
3.0 x 5	93413-114	93413-102	93413-126	92713-114	92713-102	92713-126
4.6 x 5	93414-114	93414-102	93414-126	92714-114	92714-102	92714-126
Guard Column Holder 94900-001						

HALO 120 Å OLIGO COLUMNS

Part numbers for HALO® OLIGO C18 are available in limited dimensions; all are loaded in passivated hardware. Contact Us if you have a custom column request.

Dimensions ID x Length (in mm)	HALO® OLIGO C18
2.1 x 50	P2A62-402
2.1 x 100	P2A62-602
2.1 x 150	P2A62-702
4.6 x 50	P2A64-402
4.6 x 100	P2A64-602
4.6 x 150	P2A64-702

HALO 90 Å GLYCAN COLUMNS

HALO® Glycan columns are available in 2.1 and 4.6 mm diameters in the following lengths as a 2.7 µm particle size. Guard columns are available for UHPLC and HPLC applications if additional protection is desired.

Dimensions ID x Length (in mm)	HALO® Glycan
0.3 x 150	99226-705
2.1 x 50	92922-405
2.1 x 100	92922-605
2.1 x 150	92922-705
4.6 x 50	92924-405
4.6 x 100	92924-605
4.6 x 150	92924-705
10.0 x 150	92910-705
Guard Columns, 3-Pack	
Dimensions ID x Length (in mm)	HALO® Glycan
2.1 x 5	92922-105
4.6 x 5	92924-105
Guard Column Holder 94900-001	

HALO 160 Å PEPTIDE COLUMNS

The part numbers are provided below for the capillary, analytical and semi-preparative HALO 160 Å 2, 2.7 and 5 µm phases. Guard columns are available for 2.1, 3.0 and 4.6 mm internal diameters for UHPLC and HPLC applications, if additional protection is desired.

	160 Å, 2 µm	160 Å, 2.7 µm				160 Å, 5 µm	
Dimensions ID x Length (in mm)	ES-C18	ES-C18	ES-CN	Phenyl-Hexyl	PCS C18	ES-C18	ES-CN
0.3 x 50		91226-402	91226-404	91216-406			
0.3 x 100		91226-602	91226-604	91216-606			
0.3 x 150		91226-702	91226-704	91216-706			
0.5 x 50		91225-402	91225-404	91215-406			
0.5 x 100		91225-602	91225-604	91215-606			
0.5 x 150		91225-702	91225-704	91215-706			
1.0 x 50		92121-402	92121-404	92111-406			
1.0 x 100		92121-602	92121-604	92111-606			
1.0 x 150		92121-702	92121-704	92111-706			
1.0 x 250		92121-902	92121-904				
1.5 x 50	9112X-402	9212X-402			9211X-417		
1.5 x 100	9112X-602	9212X-602			9211X-617		
1.5 x 150	9112X-702	9212X-702			9211X-717		
2.1 x 20	91122-202	92122-202	92122-204	92112-206		95122-202	95122-204
2.1 x 30	91122-302	92122-302	92122-304	92112-306		95122-302	95122-304
2.1 x 50	91122-402	92122-402	92122-404	92112-406	92112-417	95122-402	95122-404
2.1 x 75	91122-502	92122-502	92122-504	92112-506		95122-502	95122-504
2.1 x 100	91122-602	92122-602	92122-604	92112-606	92112-617	95122-602	95122-604
2.1 x 150	91122-702	92122-702	92122-704	92112-706	92112-717	95122-702	95122-704
2.1 x 250	91122-902	92122-902	92122-904	92112-906		95122-902	95122-904
3.0 x 20	91123-202	92123-202	92123-204	92113-206		95123-202	95123-204
3.0 x 30	91123-302	92123-302	92123-304	92113-306		95123-302	95123-304
3.0 x 50	91123-402	92123-402	92123-404	92113-406	92113-417	95123-402	95123-404
3.0 x 75	91123-502	92123-502	92123-504	92113-506		95123-502	95123-504
3.0 x 100	91123-602	92123-602	92123-604	92113-606	92113-617	95123-602	95123-604
3.0 x 150	91123-702	92123-702	92123-704	92113-706	92113-717	95123-702	95123-704
3.0 x 250	91123-902	92123-902	92123-904	92113-906		95123-902	95123-904
4.6 x 20		92124-202	92124-204	92114-206		95124-202	95124-204
4.6 x 30		92124-302	92124-304	92114-306		95124-302	95124-304
4.6 x 50		92124-402	92124-404	92114-406	92114-417	95124-402	95124-404
4.6 x 75		92124-502	92124-504	92114-506		95124-502	95124-504
4.6 x 100		92124-602	92124-604	92114-606	92114-617	95124-602	95124-604
4.6 x 150		92124-702	92124-704	92114-706	92114-717	95124-702	95124-704
4.6 x 250		92124-902	92124-904	92114-906		95124-902	95124-904
10.0 x 50		92120-402	92120-404	92110-406		95120-402	95120-404
10.0 x 100		92120-602	92120-604	92110-606		95120-602	95120-604
10.0 x 150		92120-702	92120-704	92110-706		95120-702	95120-704
10.0 x 250						95120-902	95120-904
Guard Columns, 3-pack							
Dimensions ID x Length (in mm)	ES-C18	ES-C18	ES-CN	Phenyl-Hexyl	PCS C18	ES-C18	ES-CN
2.1 x 5	91122-102	92122-102	92122-104	92112-106	92112-117	95122-102	95122-104
3.0 x 5	91123-102	92123-102	92123-104	92113-106	92113-117	95123-102	95123-104
4.6 x 5	-	92124-102	92124-104	92114-106	92114-117	95124-102	95124-104
Guard Column Holder	94900-001						

SURFACE PASSIVATED HARDWARE

The part numbers are provided below for the available columns prepared in surface passivated hardware. It is possible to purchase items that are not on this published list. Please contact us regarding a custom column request.

SMALL MOLECULE			
Phase	C18	Penta-HILIC	HILIC
Size	2.7 µm		
Pore	90 Å		
2.1 x 50 mm	P2812-402	P2812-405	P2812-401
2.1 x 100 mm	P2812-602	P2812-605	P2812-601
2.1 x 150 mm	P2812-702	P2812-705	P2812-701
4.6 x 150 mm	P2814-702	P2814-705	P2814-701

PEPTIDE		
Phase	ES-C18	
Size	2 µm	2.7 µm
Pore	160 Å	
2.1 x 50 mm	P1122-402	P2122-402
2.1 x 100 mm	P1122-602	P2122-602
2.1 x 150 mm	P1122-702	P2122-702
4.6 x 150 mm		P2124-702

PROTEIN							OLIGO
Phase	C4	ES-C18	Diphenyl	C4	C18	Diphenyl	OLIGO C18
Size	2.7 µm			3.4 µm			2.7 µm
Pore	1000 Å			400 Å			120 Å
2.1 x 50 mm	P2712-414	P2712-402	P2712-426	P3412-414	P3412-402	P3412-426	P2A62-402
2.1 x 100 mm	P2712-614	P2712-602	P2712-626	P3412-614	P3412-602	P3412-626	P2A62-602
2.1 x 150 mm	P2712-714	P2712-702	P2712-726	P3412-714	P3412-702	P3412-726	P2A62-702
4.6 x 50 mm							P2A64-402
4.6 X 100 mm							P2A64-602
4.6 X 150 mm	P2714-714	P2714-702	P2714-726				P2A64-702

Looking for a column that is not listed? Contact us for a custom column request.

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