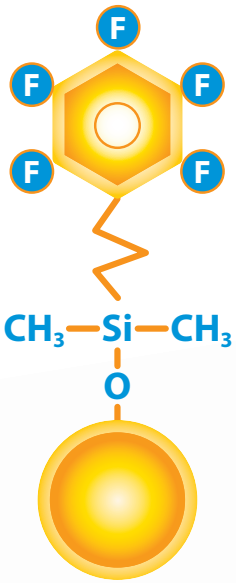
Raptor
LC Columns

Selectivity Accelerated

Get the Power of HILIC and RP Modes in One LC Column

Stationary Phase:

FluoroPhenyl



RESTEK Pure Chromatography

www.restek.com/raptor

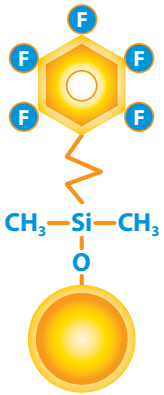
The Raptor FluoroPhenyl Column

With Raptor LC columns, Restek chemists became the first to combine the speed of 2.7 and 5 µm superficially porous particles (also known as SPP or "core-shell" particles) with the resolution of highly selective USLC technology, improving separations and speeding up analysis times with standard HPLC instruments. Raptor then evolved to bring that same improved speed, efficiency, and selectivity to UHPLC analyses by offering 1.8 µm particle columns. Learn more about Raptor LC columns at **www.restek.com/raptor**

With the addition of Raptor FluoroPhenyl columns, Restek further expanded the speed and reliability of Raptor column technology into the HILIC realm. Restek's Raptor FluoroPhenyl phase offers chromatographers the ability to run in reversed-phase or HILIC mode for a variety of compounds. The Restek Raptor FluoroPhenyl column is also amenable to LC-MS because it is extremely reliable and efficient with acidic mobile phases.

Switch to a Raptor FluoroPhenyl LC column for reliable performance in *both* reversed-phase and HILIC modes.

Column Description:



Stationary Phase Category:
Pentafluorophenyl propyl (L43)

Ligand Type:
Fluorophenyl

Particle:
1.8 µm, 2.7 µm, or 5 µm superficially porous silica (SPP or "core-shell")

Pore Size:
90 Å

Surface Area:
125 m^2/g (1.8 µm),
130 m^2/g (2.7 µm),
or 100 m^2/g (5 µm

Recommended Usage:
pH Range: 2.0–8.0

Maximum Temperature: 80 °C

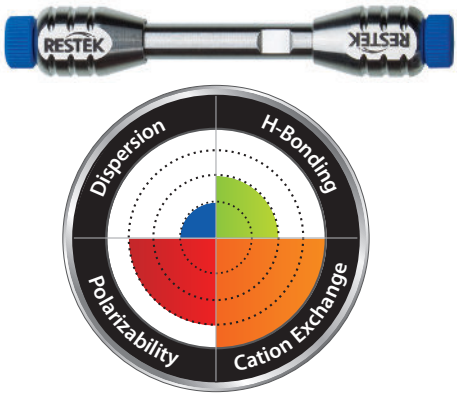
Maximum Pressure: 1,034 bar/15,000 psi* (1.8 µm),
600 bar/8,700 psi (2.7 µm); 400 bar/5,800 psi (5 µm)

** For maximum lifetime, recommended maximum pressure for 1.8 µm particles is 830 bar/12,000 psi.*

Properties:
- Capable of both reversed-phase and HILIC separations.
- Ideal for increasing sensitivity and selectivity in LC-MS analyses.
- Offers increased retention for charged bases.

Switch to a Raptor FluoroPhenyl LC column when:
- You observe limited retention and selectivity on a C18 for basic compounds.
- You need increased retention of hydrophilic compounds.

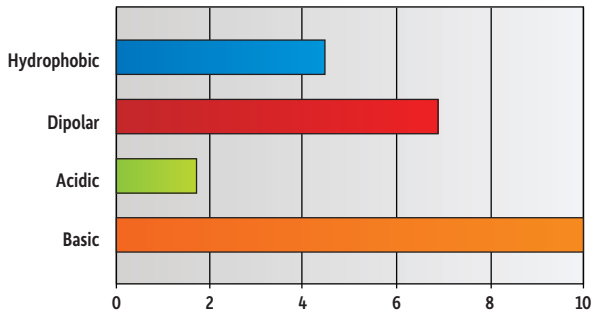
Column Interaction Profile:



Defining Solute Interaction:
- Cation exchange

Complementary Solute Interactions:
- Polarizability
- Dispersion

Solute Retention Profile:



Target Analyte Structures:
- Nitrogen-containing

Target Analyte Functionalities:
- Protonated amines
- Quaternary ammonium compounds
- Positively charged moieties
- Lewis bases

Raptor FluoroPhenyl Columns: Rugged, Check—Reproducible, Double Check.

Of course, Raptor FluoroPhenyl columns are rugged; that is to be expected. And, they are exceptionally reproducible as well. Reproducibility can be an issue for fluorinated phenyl phases, which is why we engineered all our columns for dependable performance. Lot to lot, column to column, and injection to injection, every Raptor FluoroPhenyl column gives a consistent performance that you can count on: consider it done.

Figure 1: Raptor FluoroPhenyl columns maintain efficiency in any dimension or particle size—even at their maximum recommended operating pressures—so you can run at high linear velocities with confidence.

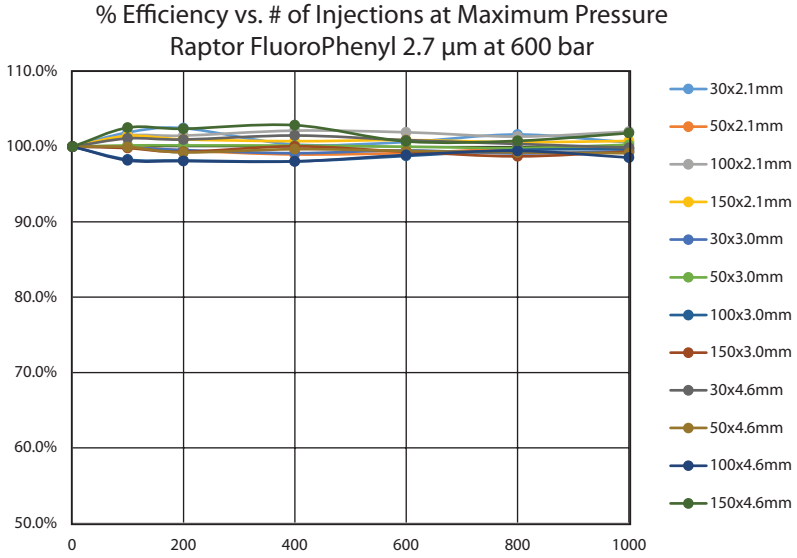
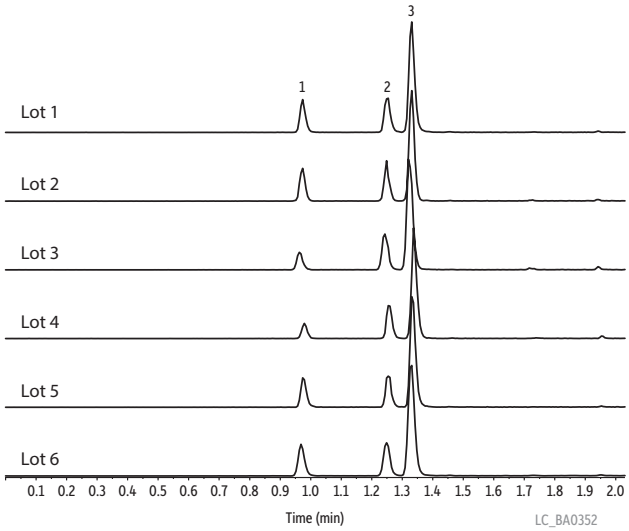


Figure 2: Strict quality control ensures Raptor FluoroPhenyl columns are exceptionally reproducible, so you get predictable performance from every column.

Reliable, reproducible fluorophenyl column performance.

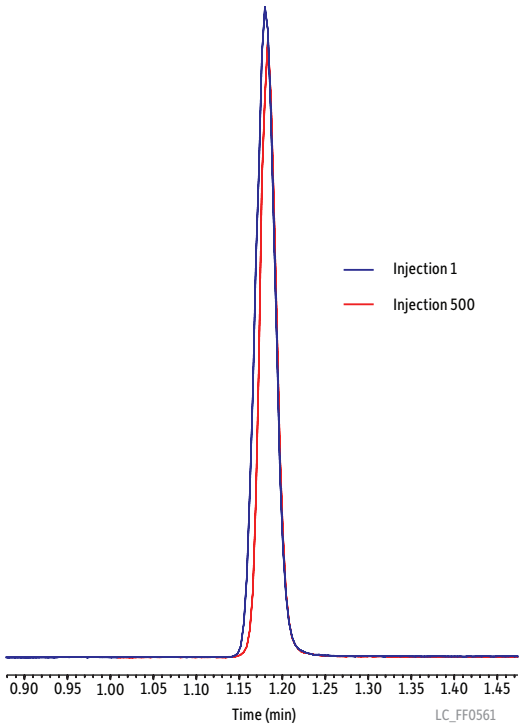
Peaks	t_R (min)	Precursor Ion	Product Ion 1	Product Ion 2
1. Baccatin III	0.97	587.0	405.1	105.0
2. Docetaxel	1.25	808.1	527.3	226.1
3. Paclitaxel	1.33	854.1	569.3	286.2



Column: Raptor FluoroPhenyl (cat.# 931955E); Dimensions: 50 mm x 3 mm ID, Particle Size: 5 µm; Temp.: 35 °C; **Sample:** Diluent: Water; Conc.: 100 ng/mL; Inj. Vol.: 5 µL; **Mobile Phase:** A: 0.1% Formic acid in water; B: 0.1% Formic acid in acetonitrile; **Gradient (%B):** 0.00 min (25% B), 2.00 (95% B), 2.01 (25% B), 3.50 (25% B); **Flow:** 0.8 mL/min; **Detector:** MS/MS; Ion Mode: ESI+; Mode: MRM; **Instrument:** UHPLC.

Figure 3: From start to finish, Raptor FluoroPhenyl columns provide accurate, reproducible results.

Peaks	t_R (min)	Precursor Ion	Product Ion
1. 4-Methylimidazole (4-MEI)	1.19	83	56

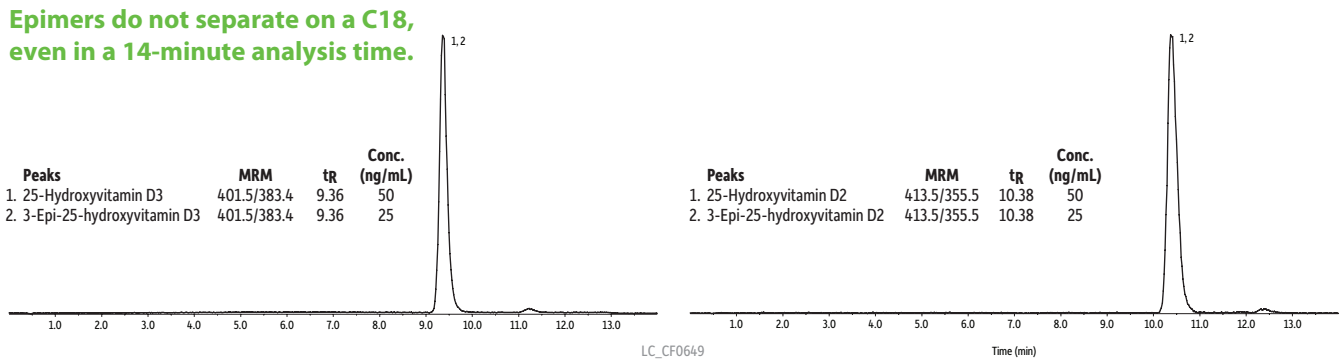


Column: Raptor FluoroPhenyl (cat.# 9319A52); Dimensions: 50 mm x 2.1 mm ID, Particle Size: 2.7 µm; Temp.: 35 °C; **Sample:** Diluent: Acetonitrile; Conc.: 100 ng/mL; Inj. Vol.: 5 µL; **Mobile Phase:** A: 0.1% Formic acid in water; B: 0.1% Formic acid in acetonitrile; **Gradient (%B):** 0.00 min (95% B), 2.00 (30% B), 2.01 (95% B), 3.50 (95% B); Flow: 0.6 mL/min; **Detector:** MS/MS; Ion Mode: ESI+; Mode: MRM; **Instrument:** UHPLC.

More Separating Power than a C18

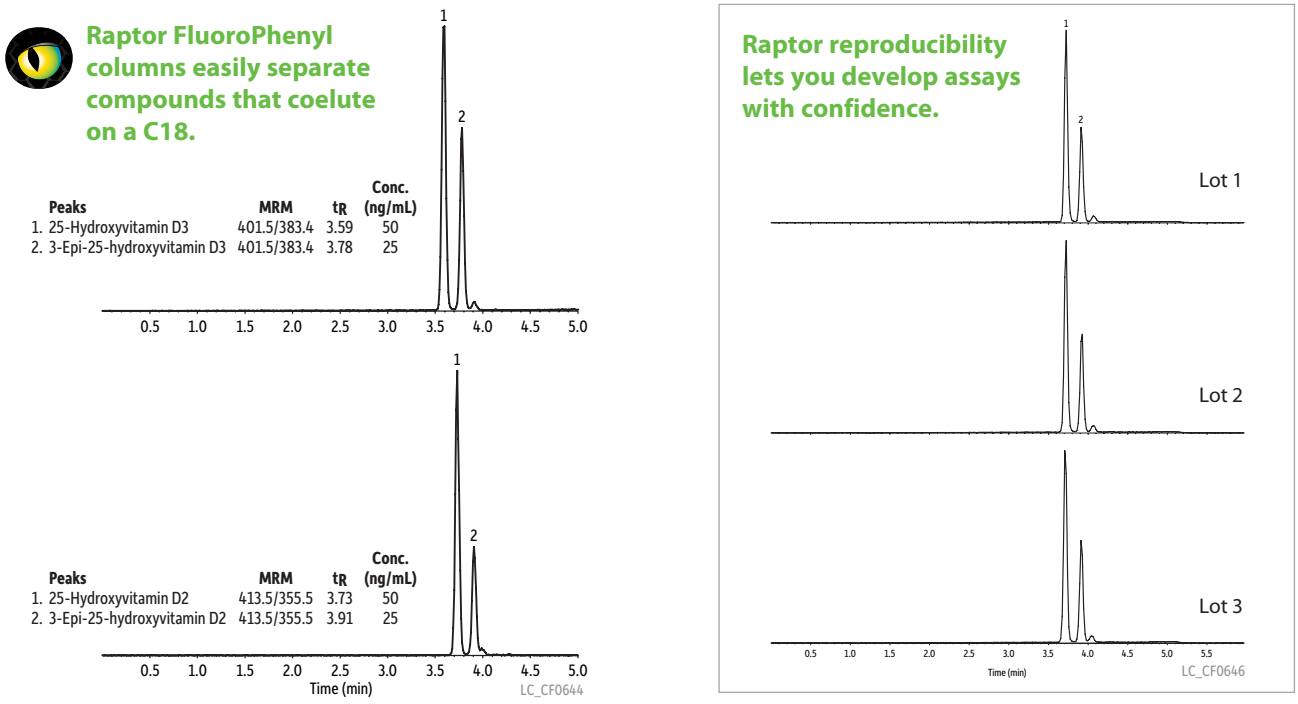
C18 columns work well for many compounds, but they just don't work for everything. Raptor FluoroPhenyl columns can provide greater selectivity and retention for analytes that are not easily separated by C18 phase chemistry. For example, interest in vitamin D status is on the rise in clinical diagnostics, but accurate analysis is only possible if the epimeric forms of both vitamin D2 and D3 25-hydroxy metabolites can be distinguished. Typical reversed-phase C18 columns cannot separate these isobaric epimers, which differ in bioactivity, but the new Raptor FluoroPhenyl column provides adequate chromatographic resolution so accurate results are generated and the proper diagnosis can be made.

Figure 4: Reversed-phase C18 columns do not have the right selectivity or retention mechanism to separate the epimers of vitamin D2 and D3 25-hydroxy metabolites.



Column: Raptor ARC-18 (cat.# 9314A12); Dimensions: 100 mm x 2.1 mm ID, Particle Size: 2.7 µm; Temp.: 30 °C; **Sample:** Diluent: Water:methanol (50:50); Conc.: 25-50 ng/mL; Inj. Vol.: 5 µL; **Mobile Phase:** A: 0.1% Formic acid in water; B: Methanol; **Gradient (%B):** 0.00 min (75% B), 4.00 (80% B), 12.00 (80% B), 12.10 (75% B); 14.00 (75% B); **Flow:** 0.5 mL/min; **Detector:** MS/MS; Ion Mode: ESI+; Mode: MRM; **Instrument**: HPLC.

Figure 5: Raptor FluoroPhenyl columns have the selectivity and retention you need to quickly and easily separate compounds that coelute on a C18, such as the epimeric forms of vitamin D2 and D3 25-hydroxy metabolites.



Column: Raptor FluoroPhenyl (cat.# 9319A1E); Dimensions: 100 mm x 3 mm ID, Particle Size: 2.7 µm; Temp.: 30 °C; **Sample:** Diluent: Water:methanol (50:50); Conc.: 25-50 ng/mL; Inj. Vol.: 5 µL; **Mobile Phase:** A: 0.1% Formic acid in water; B: Methanol; **Gradient (%B):** 0.00 min (75% B), 4.00 (85% B), 4.10 (100% B), 5.00 (100% B), 5.01 (75% B), 7.00 (75% B); **Flow:** 0.6 mL/min; **Detector:** MS/MS; Ion Mode: ESI+; Mode: MRM; **Instrument**: HPLC.

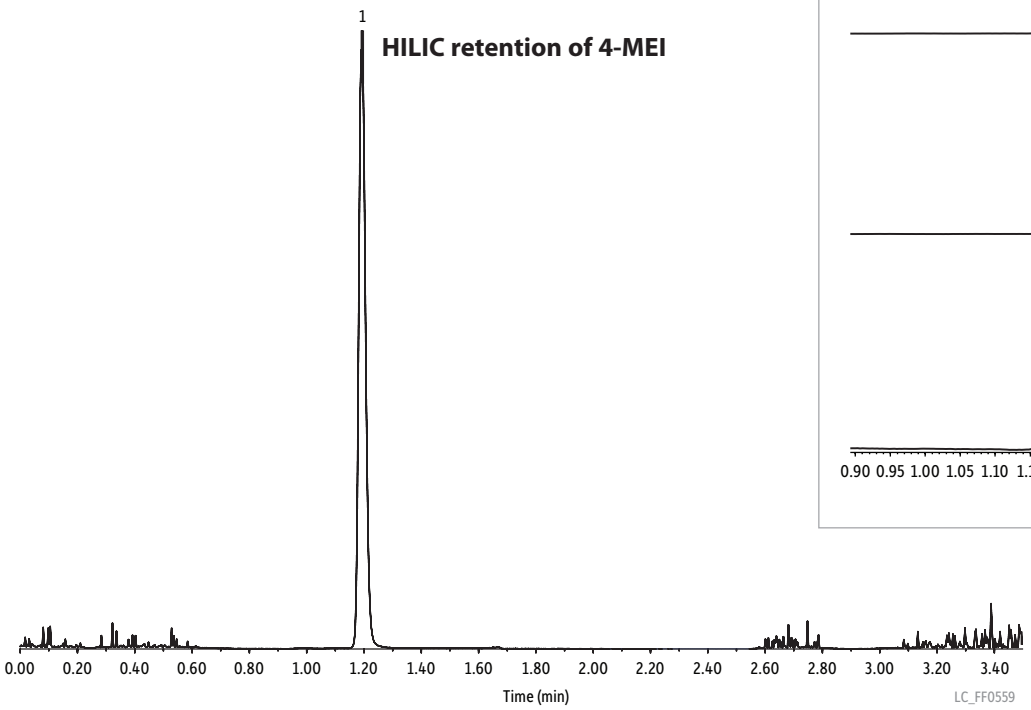
Get the Power of HILIC and RP Modes in One LC Column

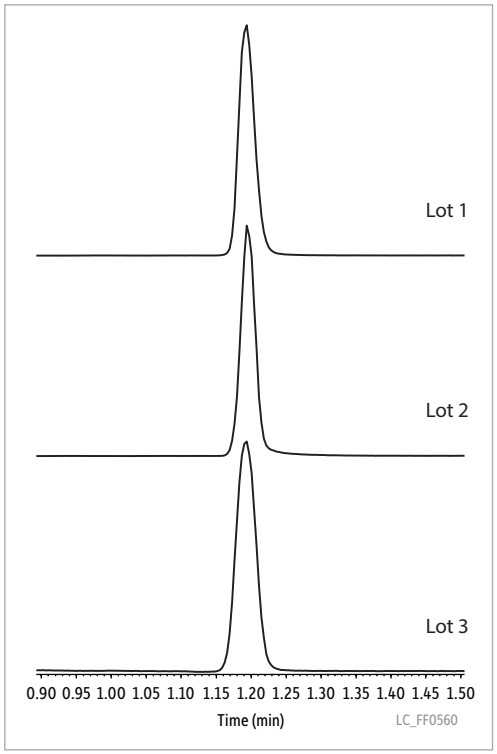
HILIC chromatography is becoming the go-to solution for compounds that are difficult to retain on a C18. The Raptor FluoroPhenyl column gives chromatographers the flexibility to evaluate compound retention in both reversed-phase and HILIC modes. The analysis of 4-methylimidazole (4-MEI), which is a byproduct of caramel coloring in foods and beverages, can be problematic by reversed-phase chromatography due to very limited retention. However, 4-MEI is well retained on a Raptor FluoroPhenyl column and can easily be analyzed using HILIC mode and simple LC and LC-MS/MS compatible mobile phases.

Figure 6: Sometimes, adequate retention cannot be obtained with a C18. The Raptor FluoroPhenyl column performs dependably in either HILIC or RP mode, so you can use the mode that is best for your analytes.

Raptor FluoroPhenyl columns give you the flexibility to work in both reversed-phase and HILIC modes.

Peaks	t_R (min)	Precursor Ion	Product Ion
1. 4-Methylimidazole (4-MEI)	1.19	83	56





Column: Raptor FluoroPhenyl (cat.# 9319A52); Dimensions: 50 mm x 2.1 mm ID; Particle Size: 2.7 µm; Temp.: 35 °C; **Sample:** Diluent: Acetonitrile; Conc.: 100 ng/mL; Inj. Vol.: 5 µL; **Mobile Phase:** A: 0.1% Formic acid in water; B: 0.1% Formic acid in acetonitrile; **Gradient (%B):** 0.00 min (95% B), 2.00 (30% B), 2.01 (95% B), 3.50 (95% B); **Flow:** 0.6 mL/min; **Detector:** MS/MS; Ion Mode: ESI+; Mode: MRM; **Instrument:** UHPLC.

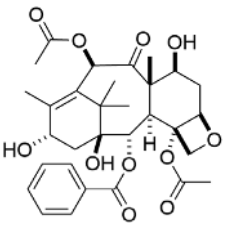
Fast, Accurate Analysis of Basic Compounds

Taxane drugs—such as paclitaxel, docetaxel, and their precursor, baccatin III—are early chemotherapy treatment options. Accurate analysis is critical because these drugs are used for many types of metastatic cancers. As shown here, the selectivity of the Raptor FluoroPhenyl column provides excellent retention and resolution of these structurally similar compounds. Reliable results for these basic compounds can be obtained in fast analysis times using LC-MS/MS friendly solvents.

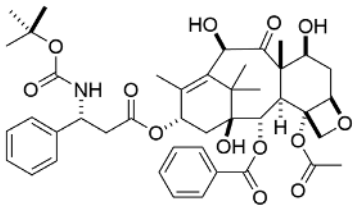
Figure 7: Raptor FluoroPhenyl columns allow taxane drugs and other basic compounds to be separated quickly and effectively.

Raptor FluoroPhenyl columns have the retention needed for fast, accurate analysis of basic compounds.

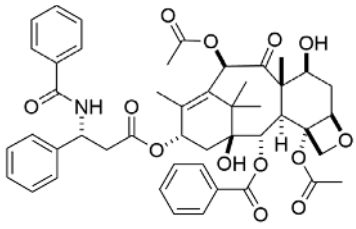
Peaks	t_R (min)	Precursor Ion	Product Ion 1	Product Ion 2
1. Baccatin III	0.97	587.0	405.1	105.0
2. Docetaxel	1.25	808.1	527.3	226.1
3. Paclitaxel	1.33	854.1	569.3	286.2



Baccatin III



Docetaxel



Paclitaxel

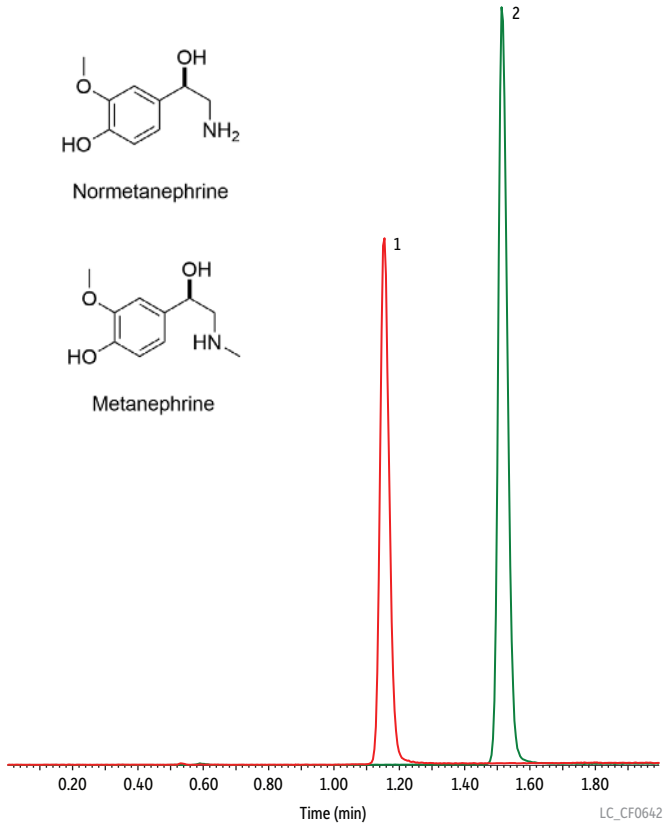
Column: Raptor FluoroPhenyl (cat.# 931955E); Dimensions: 50 mm x 3 mm ID, Particle Size: 5 µm; Temp.: 35 °C; **Sample:** Diluent: Water; Conc.: 100 ng/mL; Inj. Vol.: 5 µL; **Mobile Phase:** A: 0.1% Formic acid in water; B: 0.1% Formic acid in acetonitrile; **Gradient (%B):** 0.00 (25% B), 2.00 (95% B), 2.01 (25% B), 3.50 (25% B); **Flow:** 0.8 mL/min; **Detector:** MS/MS; Ion Mode: ESI+; Mode: MRM; **Instrument**: UHPLC.

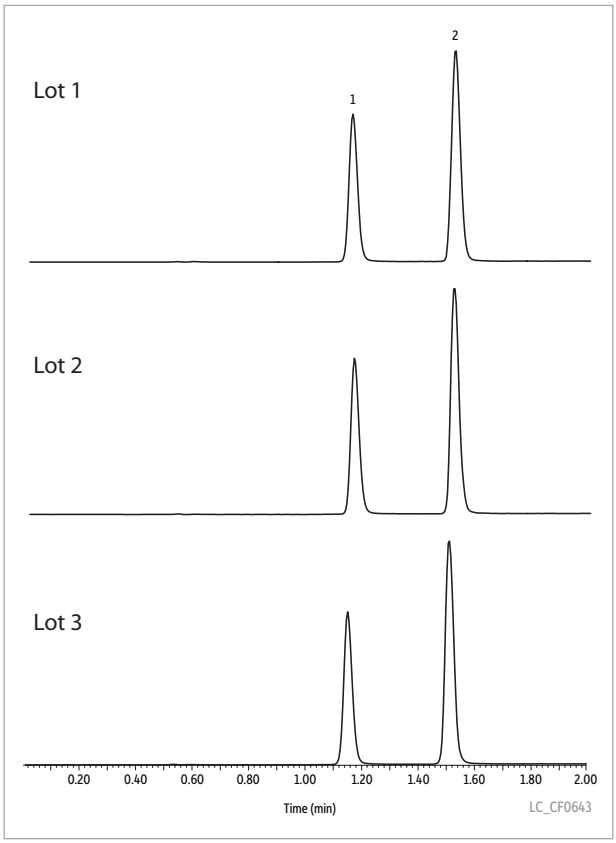
Exceptional Selectivity for Clinical Analyses

The analysis of normetanephrine and metanephrine provides another example of the power of Raptor FluoroPhenyl columns for analyzing basic compounds. Accurately determining these metabolites of epinephrine/norepinephrine in plasma or urine is one of the best diagnostic tests for neuroendocrine tumors (pheochromocytomas). Normetanephrine and metanephrine are difficult to retain by typical C18 reversed-phase chromatography; however, the Raptor FluoroPhenyl column provides a simple, fast chromatographic solution to this challenging assay. The Raptor FluoroPhenyl column's unique combination of aromatic retention and cation exchange mechanisms are not provided by a C18 column and result in reliable, high-quality separations.

Figure 8: Rapid analysis of metanephrine and normetanephrine on a Raptor FluoroPhenyl column.

Peaks	t_R (min)	Precursor Ion	Product Ion 1	Product Ion 2
1. Normetanephrine	1.15	166.1	121.1	134.0
2. Metanephrine	1.52	180.1	165.1	148.3





Column: Raptor FluoroPhenyl (cat.# 9319A12); Dimensions: 100 mm x 2.1 mm ID; Particle Size: 2.7 µm; Temp.: 30 °C; **Sample:** Diluent: Water; Conc.: 20 ng/mL; Inj. Vol.: 5 µL; **Mobile Phase:** A: 0.2% Formic acid in water; B: Methanol; **Gradient (%B):** 0.00 min (2% B), 2.00 (40% B), 2.01 (2% B), 6.00 (2% B); Flow: 0.4 mL/min; **Detector:** MS/MS; Ion Mode: ESI+; Mode: MRM; **Instrument**: UHPLC.

Dependable Raptor FluoroPhenyl Columns Give You the Flexibility to Use Both HILIC and RP Modes

Raptor FluoroPhenyl LC Columns (USP L43)

Length	2.1 mm cat.#	3.0 mm cat.#	4.6 mm cat.#
1.8 µm Columns			
30 mm	9319232	—	—
50 mm	9319252	931925E	—
100 mm	9319212	931921E	—
150 mm	9319262	—	—
2.7 µm Columns			
30 mm	9319A32	9319A3E	9319A35
50 mm	9319A52	9319A5E	9319A55
100 mm	9319A12	9319A1E	9319A15
150 mm	9319A62	9319A6E	9319A65
5 µm Columns			
30 mm	—	931953E	—
50 mm	9319552	931955E	9319555
100 mm	9319512	931951E	9319515
150 mm	9319562	931956E	9319565
250 mm	—	—	9319575

EXP Reusable Fittings for HPLC & UHPLC

for 10-32 fittings and $^{1}/_{16}$" tubing

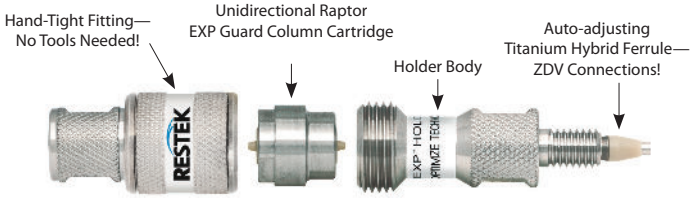
Effortlessly achieve 8,700+ psi HPLC seals by hand! (Wrench tighten to 20,000+ psi.) Hybrid titanium/PEEK seal can be installed repeatedly without compromising your seal.

Description	qty.	cat.#
EXP Hand-Tight Fitting (Nut w/Ferrule)	ea.	25937
EXP Hand-Tight Fitting (Nut w/Ferrule)	10-pk.	25938
EXP Hand-Tight Nut (w/o Ferrule)	ea.	25939

Hybrid Ferrule U.S. Patent No. 8201854, EXP Holders U.S. Patent No. 8696902, EXP2 Wrench U.S. Patent No. D766055. Other U.S. and Foreign Patents Pending. The EXP, Free-Turn, and the Opti- prefix are registered trademarks of Optimize Technologies, Inc.

Experience *Selectivity Accelerated.*
Order the Raptor FluoroPhenyl today at **www.restek.com/raptor**

Raptor EXP Guard Cartridges—for All Raptor Columns



Protect your investment, extend the life of our already-rugged LC columns, and change guard column cartridges by hand without breaking fluid connections—no tools needed! Great with any Raptor column to get ultimate protection from particulates and matrix contamination, especially when using dilute-and-shoot or other minimal sample preparation techniques.

EXP Direct Connect Holder

Description	qty.	cat.#
EXP Direct Connect Holder for EXP Guard Cartridges (includes hex-head fitting & 2 ferrules)	ea.	25808

Maximum holder pressure: 20,000 psi (1,400 bar)

Raptor EXP Guard Column Cartridges

Description	Particle Size	qty.	5 x 2.1 mm cat.#	5 x 3.0 mm cat.#	5 x 4.6 mm cat.#
Raptor FluoroPhenyl EXP Guard Column Cartridge	UHPLC	3-pk.	9319U0252	9319U0253	
Raptor FluoroPhenyl EXP Guard Column Cartridges	2.7 µm	3-pk.	9319A0252	9319A0253	9319A0250
Raptor FluoroPhenyl EXP Guard Column Cartridges	5 µm	3-pk.	931950252	931950253	931950250

1,034 bar/15,000 psi* (UHPLC), 600 bar/8,700 psi (2.7 µm); 400 bar/5,800 psi (5 µm).
* For maximum lifetime, recommended maximum pressure for 1.8 µm particles is 830 bar/12,000 psi.

Raptor SPP LC columns combine the speed of SPP with the resolution of USLC technology.
Learn more at **www.restek.com/raptor**

UltraShield UHPLC PreColumn Filter—for 1.8 µm Raptor Columns

Pair 1.8 µm Raptor columns with an UltraShield filter instead of a guard cartridge to protect against particulates, minimize extra column volume, and maximize UHPLC sample throughput when using SPE, SLE, or other extensive sample preparations.

Description	Filter Porosity	qty.	cat.#
UltraShield UHPLC PreColumn Filter	0.2 µm frit	ea.	25809
		5-pk.	25810
		10-pk.	25811

RESTEK
Pure Chromatography

Questions about this or any other Restek product?
Contact us or your local Restek representative (www.restek.com/contact-us).

www.restek.com

Lit. Cat.# GNBR2368B-UNV