Restek LC

Accurately Analyze Metal-Sensitive Compounds

with Restek's New Inert LC Columns and Guards

- **Improved peak shape** without passivation or mobile phase additives.
- **Increased response and analyte recovery,** allowing lower detection limits.
- **High accuracy and throughput** with less variability.
- **Less time-consuming conditioning** and complicated passivation required.

INERT



RESTEK Pure Chromatography BGB GC|LC MS|CE

Accurately Analyze Metal-Sensitive Compounds with Restek's New Inert LC Columns and Guards

Our new inert LC column technology helps labs improve their analysis of metal-sensitive compounds. A premium inert coating applied to the stainless-steel surface of our LC columns reduces nonspecific binding of chelating analytes, enabling sensitive analysis and smooth integration of peaks. Combined with Restek's selective stationary phases, these new inert LC columns are ideal for the analysis of metal-sensitive compounds, such as organophosphorus pesticides and mycotoxins.

Restek's inert LC columns provide four key benefits:

- **Improved peak shape** without passivation or mobile phase additives.
- **Increased response and analyte recovery,** allowing lower detection limits.
- **High accuracy and throughput** with less variability.
- **Less time-consuming conditioning** and complicated passivation required.

Exceptional Inertness Brings Exceptional Performance

Analyzing compounds that have nonspecific adsorption (NSA) or nonspecific binding (NSB) to metal surfaces in LC columns has historically been a challenge. Poor peak shape and sensitivity are key indicators that polar, usually acidic, compounds are interacting with the metal surfaces in the column, causing poor data quality. Our premium inert column technology is designed to eliminate NSA and NSB of active analytes to the column hardware, giving analysts greater confidence in their data when working with metal-sensitive analytes.

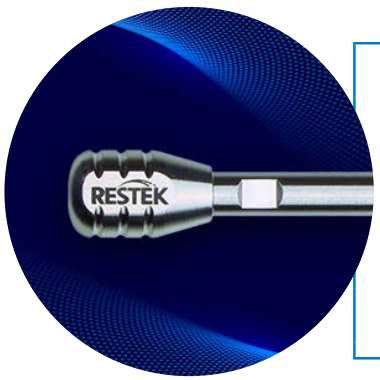


Pair Your Inert LC Column with an Inert Guard Column for Even Greater Benefits

Available in a variety of stationary phases, our inert guard columns provide optimal protection to your LC column and system while also reducing nonspecific binding of chelating analytes. Our standalone guard columns can be used in conjunction with any LC column and are specifically designed to complement and enhance the performance of our inert columns. Go to page 11 to see the improved performance when using an inert LC column and guard compared to a conventional stainless-steel column and guard.

An Extensive Product Line to Meet You Unique Needs

Restek's inert LC column technology is available in various column types to accommodate a wide range of applications and testing methodologies. Our inert columns are now available for the following phase types: Raptor Biphenyl, Raptor C18, Raptor ARC-18, Force Biphenyl, and Force C18. The following columns are recommended for these specific applications:

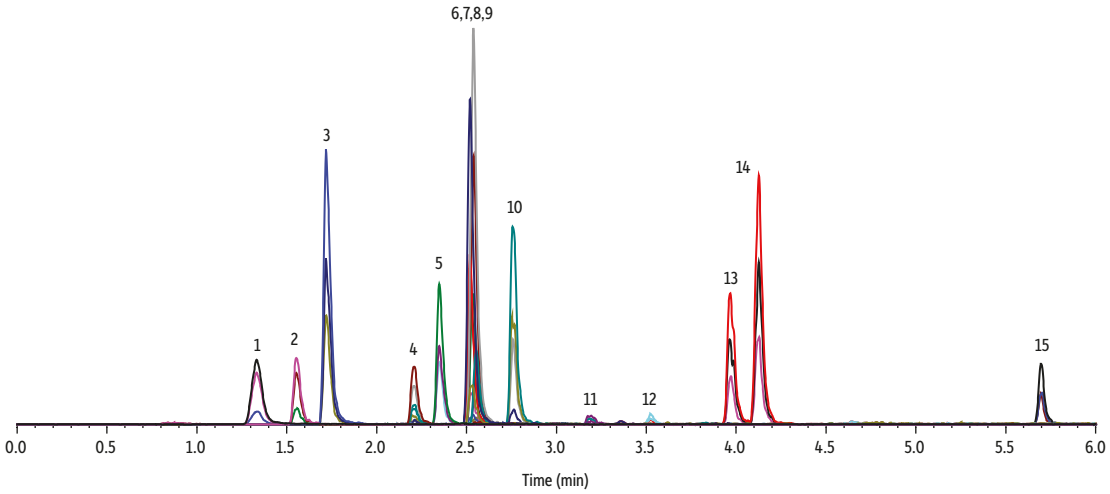


Inert LC Column	*Application*
Raptor Inert ARC-18	*Pesticides*
Raptor Inert Biphenyl	*Mycotoxins*
Force Inert C18	*Methylmalonic Acid*
Raptor Inert C18	*Veterinary Drugs*

Pesticides

Pesticide panels benefit from the use of inert LC columns as they contain a wide variety of compounds. Phosphorylated, acidic, polar compounds, and/or metal chelating species, such as organophosphate pesticides, are reactive to the metal surfaces inside of the analytical column. Our new inert LC columns solve that problem easily to improve the overall performance of your pesticide panel.

Figure 1: Our new Raptor inert ARC-18 columns offer increased sensitivity, recoveries, and lower detection limits without any column preconditioning.



LC_EV0596

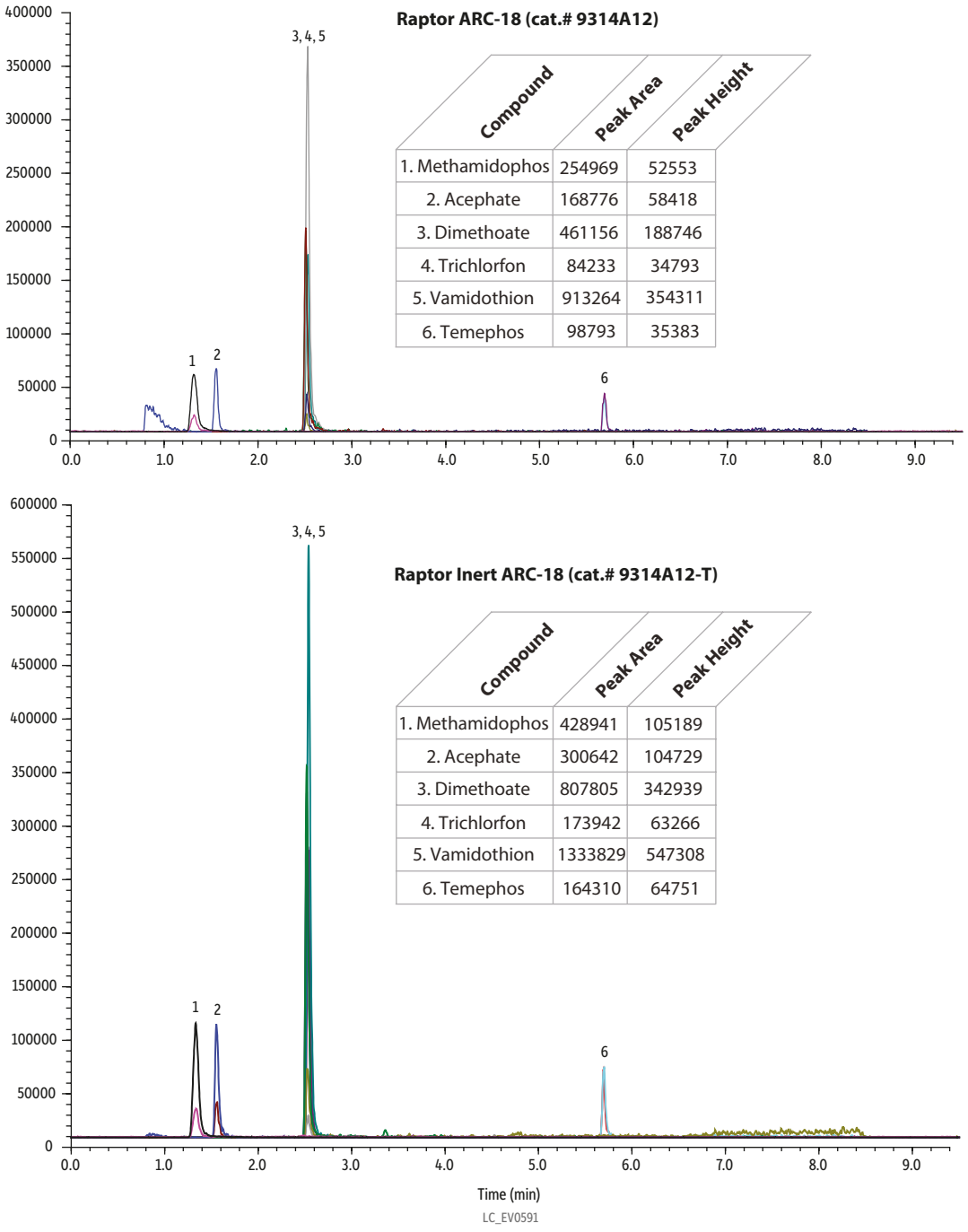
Peaks	t_R (min)	Precursor Ion	Product Ion 1	Product Ion 2	Peak Area	Peak Height
1. Methamidophos	1.33	142.0	94.0	125.1	428941	105189
2. Acephate	1.55	184.0	143.0	48.9	300642	104729
3. Omethoate	1.72	214.0	125.0	182.9	892008	337690
4. Monocrotophos	2.21	224.1	127.0	193.1	215810	78425
5. Dicrotophos	2.35	238.1	112.1	72.0	404916	159292
6. Dimethoate	2.52	230.0	125.0	199.0	807805	342939
7. Trichlorfon	2.53	257.0	108.9	220.8	173942	63266
8. Vamidothion	2.54	288.0	146.0	118.0	1333829	547308
9. Mevinphos isomer 1	2.55	241.9	126.9	192.9	311274	129961
10. Mevinphos isomer 2	2.76	241.9	126.9	192.9	74030	29802
11. Carbaryl	3.18	202.1	145.0	127.0	39671	11924
12. Isocarbophos	3.52	291.1	231.1	121.1	33294	11941
13. Dimethomorph isomer 1	3.96	388.2	300.9	165.1	511766	172977
14. Dimethomorph isomer 2	4.13	388.2	300.9	165.1	877031	328826
15. Temephos	5.70	467.1	124.9	418.9	164310	64751

Column Raptor Inert ARC-18 (cat.# 9314A12-T)
Dimensions: 100 mm x 2.1 mm ID
Particle Size: 2.7 µm
Pore Size: 90 Å
Temp.: 50 °C
Standard/Sample LC multiresidue pesticide standard #1 (cat.# 31972)
Diluent: Water, 0.1% formic acid
Conc.: 1 ng/mL
Inj. Vol.: 5 µL
Mobile Phase
A: Water, 2 mM ammonium formate, 0.1% formic acid
B: Methanol, 2 mM ammonium formate, 0.1% formic acid

Time (min)	Flow (mL/min)	%A	%B
0.00	0.4	95	5
2.00	0.4	40	60
4.00	0.4	25	75
6.00	0.4	0	100
7.50	0.4	0	100
7.51	0.4	95	5
9.00	0.4	95	5

Max Pressure: **258 bar**
Detector Shimadzu LCMS-8060
Ion Mode: ESI+
Mode: MRM
Instrument Shimadzu Nexera X2

Figure 2: Compared to a conventional, stainless-steel column, our new Raptor inert ARC-18 columns provide exceptional analyte recoveries.



Compound	Peak Area	Peak Height
1. Methamidophos	254969	52553
2. Acephate	168776	58418
3. Dimethoate	461156	188746
4. Trichlorfon	84233	34793
5. Vamidothion	913264	354311
6. Temephos	98793	35383

Compound	Peak Area	Peak Height
1. Methamidophos	428941	105189
2. Acephate	300642	104729
3. Dimethoate	807805	342939
4. Trichlorfon	173942	63266
5. Vamidothion	1333829	547308
6. Temephos	164310	64751

Figure 3: Peak area and peak height are greatly improved for the analysis of pesticides.

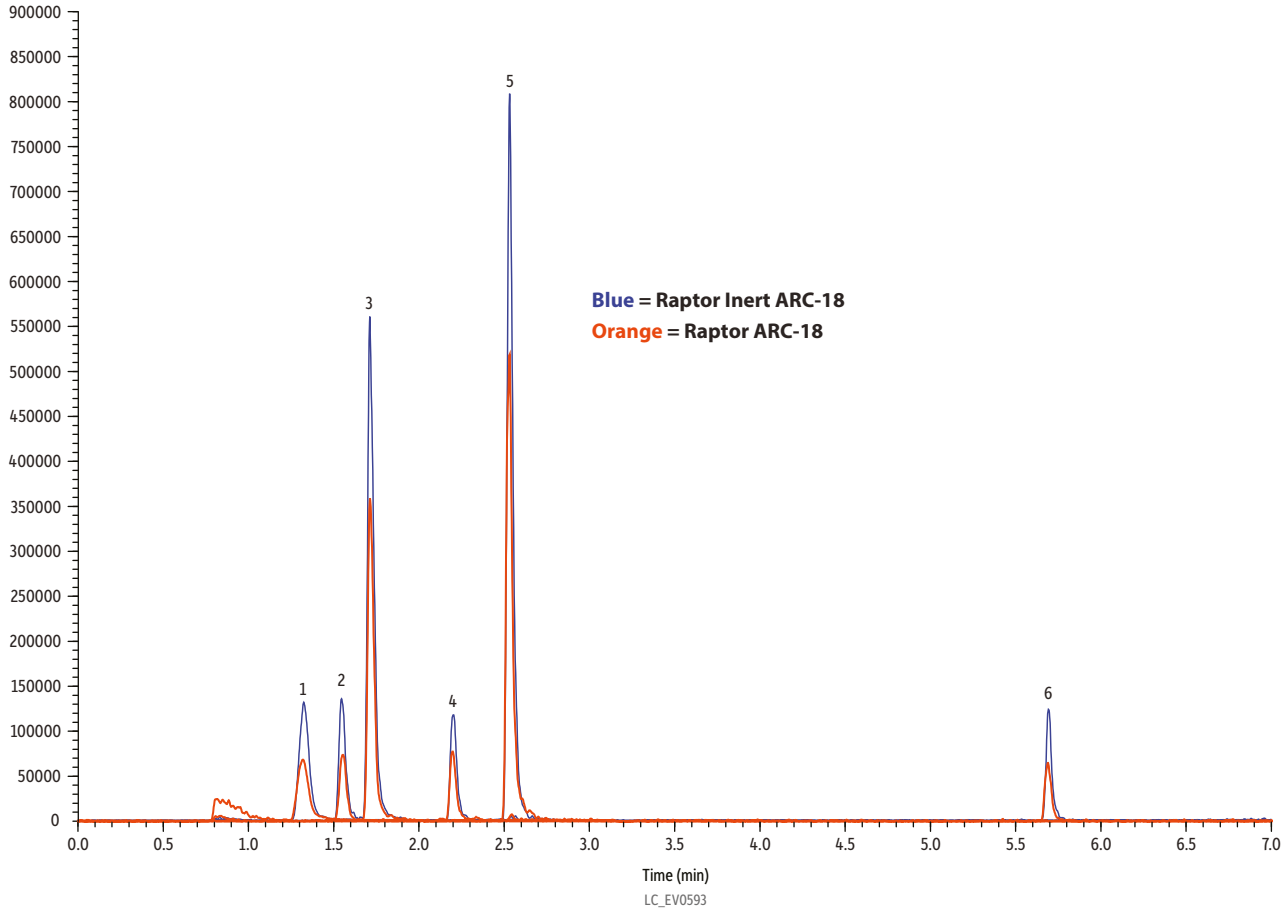


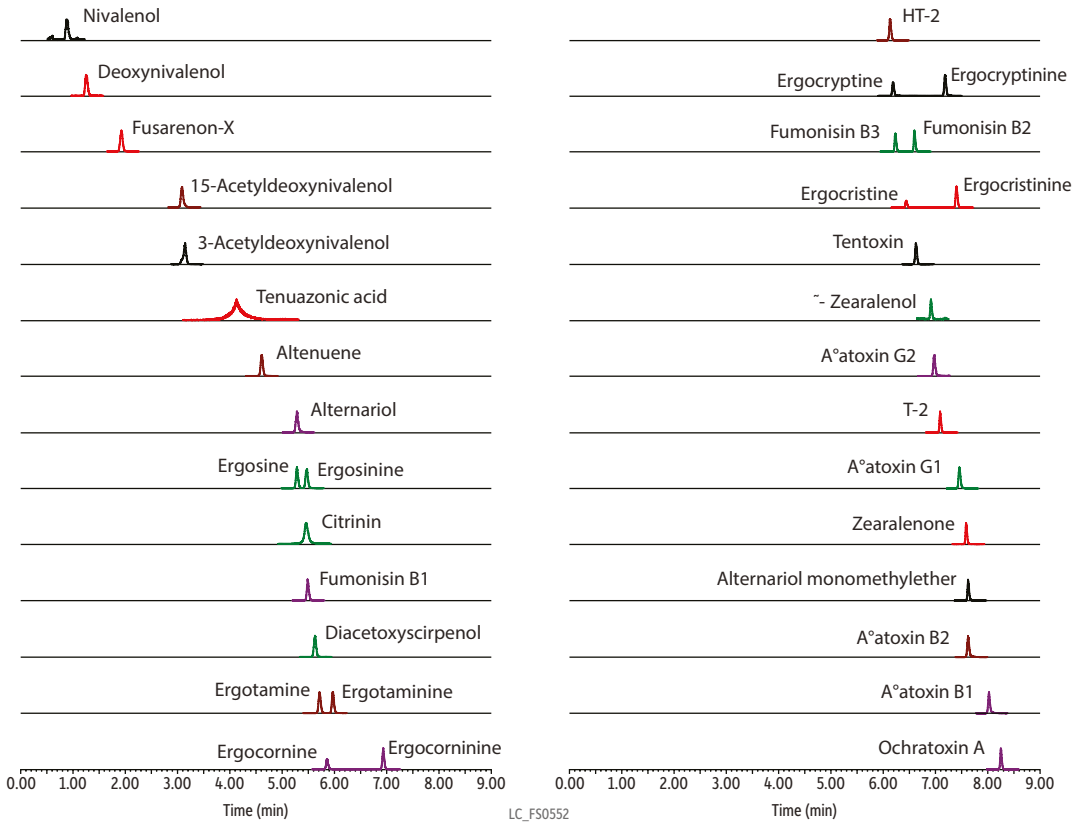
Table I: Restek's new inert columns showed up to 2x improvement in peak area and peak height over stainless-steel columns in this analysis of pesticides.

	Peak Area			Peak Height		
Compound	Stainless Steel	Inert	Areas Ratio (Inert/Stainless Steel)	Stainless Steel	Inert	Height Ratio (Inert/Stainless Steel)
Methamidophos	254969	428941	**1.68**	52553	105189	**2.00**
Acephate	168776	300642	**1.78**	58418	104729	**1.79**
Omethoate	579502	892008	**1.54**	216157	337690	**1.56**
Monocrotophos	140095	215810	**1.54**	51402	78425	**1.53**
Dicrotophos	340978	404916	**1.19**	135380	159292	**1.18**
Dimethoate	461156	807805	**1.75**	188746	342939	**1.82**
Trichlorfon	84233	173942	**2.07**	34793	63266	**1.82**
Vamidothion	913264	1333829	**1.46**	354311	547308	**1.54**
Mevinphos isomer 1	213632	311274	**1.46**	82105	129961	**1.58**
Mevinphos isomer 2	56093	74030	**1.32**	29070	29802	**1.03**
Carbaryl	43590	39671	**0.91**	14563	11924	**0.82**
Isocarbophos	21587	33294	**1.54**	9062	11941	**1.32**
Dimethomorph isomer 1	462425	511766	**1.11**	166990	172977	**1.04**
Dimethomorph isomer 2	896109	877031	**0.98**	311657	328826	**1.06**
Temephos	98793	164310	**1.66**	35383	64751	**1.83**

Mycotoxins

Mycotoxins analysis can be challenging and often requires a great deal of column conditioning and equilibration to achieve acceptable peaks. This is due to the reactive nature of the compounds, which contain acidic, polar, or otherwise metal chelating groups. Our new inert column hardware, combined with our stationary phases, helps simplify methods and improve the response and peak shape of these compounds.

Figure 4: Achieve excellent peak shape without acid additional passivation or mobile phase additives when analyzing mycotoxins with our new Raptor inert biphenyl columns.



Peaks	tR (min)	Conc. (ng/mL)	Precursor Ion	Product Ion	Peak Area	Peak Height
1. Nivalenol	0.88	10	295.1	137.1	4182	64495
2. Deoxynivalenol	1.25	10	297.2	231.0	17346	281906
3. Fusarenon-X	1.92	10	355.1	137.1	7668	121790
4. 15-Acetyldeoxynivalenol	3.08	10	339.2	137.1	31369	517570
5. 3-Acetyldeoxynivalenol	3.14	10	339.2	213.1	22613	296396
6. Tenuazonic acid	4.11	10	198.1	125.0	47828	197658
7. Altenuene	4.60	10	293.2	257.1	113850	2059699
8. Alternariol	5.27	10	259.0	185.1	73272	1302192
9. Ergosine	5.28	10	548.4	208.1	486620	9366601
10. Citrinin	5.46	10	251.2	233.1	1007880	9828889
11. Ergosinine	5.46	10	548.4	208.1	496734	8740527
12. Fumonisin B1	5.48	10	722.5	352.3	122878	2415567
13. Diacetoxyscirpenol	5.62	10	384.2	247.1	68139	1208825
14. Ergotamine	5.71	10	582.4	223.2	493003	9274155
15. Ergocornine	5.85	10	562.4	268.2	387025	7732744
16. Ergotaminine	5.96	10	582.4	223.2	462119	9237991
17. HT-2	6.13	10	447.2	345.1	15221	323765
18. Ergocryptine	6.19	10	576.4	268.2	522204	11360838
19. Fumonisin B3	6.23	10	706.4	336.2	143302	3444421
20. Ergocristine	6.44	10	610.4	223.2	195562	4450058
21. Fumonisin B2	6.59	10	706.4	336.2	151719	3869822
22. Tentoxin	6.62	10	415.2	312.2	95175	2131906
23. α-Zearalenol	6.91	10	303.1	285.1	30224	702420
24. Ergocorninine	6.93	10	562.4	268.2	704029	14389283
25. Aflatoxin G2	6.97	10	331.2	189.0	262824	5274353
26. T-2	7.09	10	489.2	387.1	56535	1394735
27. Ergocryptinine	7.18	10	576.4	268.2	778972	16765348
28. Ergocristinine	7.40	10	610.4	223.2	1583053	32975663
29. Aflatoxin G1	7.45	10	329.1	199.7	304389	6102959
30. Zearalenone	7.59	10	319.2	283.1	37162	927455
31. Alternariol monomethylether	7.62	10	273.0	199.1	31024	640689
32. Aflatoxin B2	7.63	10	315.1	287.0	295648	5724754
33. Aflatoxin B1	8.02	10	313.2	241.1	223520	4425821
34. Ochratoxin A	8.25	10	404.1	239.0	190060	4411953

Column	Raptor Inert Biphenyl (cat.# 9309A12-T)
Dimensions:	100 mm x 2.1 mm ID
Particle Size:	2.7 µm
Pore Size:	90 Å
Temp.:	60 °C
Standard/Sample	Aflatoxins standard (cat.# 34121)
	Ochratoxin A standard (cat.# 34122)
Diluent:	50:50 Water:methanol
Conc.:	10 ng/mL
Inj. Vol.:	5 µL
Mobile Phase	
A:	Water, 0.05% formic acid
B:	Methanol, 0.05% formic acid

Time (min)	Flow (mL/min)	%A	%B
0.00	0.4	75	25
5.00	0.4	50	50
9.00	0.4	0	100
9.01	0.4	75	25
11.0	0.4	75	25

Max Pressure:	**440 bar**
Detector	Waters Xevo TQ-S
Ion Mode:	ESI+
Mode:	MRM
Instrument	Waters ACQUITY UPLC I-Class

Figure 5: In this analysis of fumonisins, our new Raptor inert biphenyl columns achieve a dramatic increase in peak area compared to conventional, stainless-steel columns.

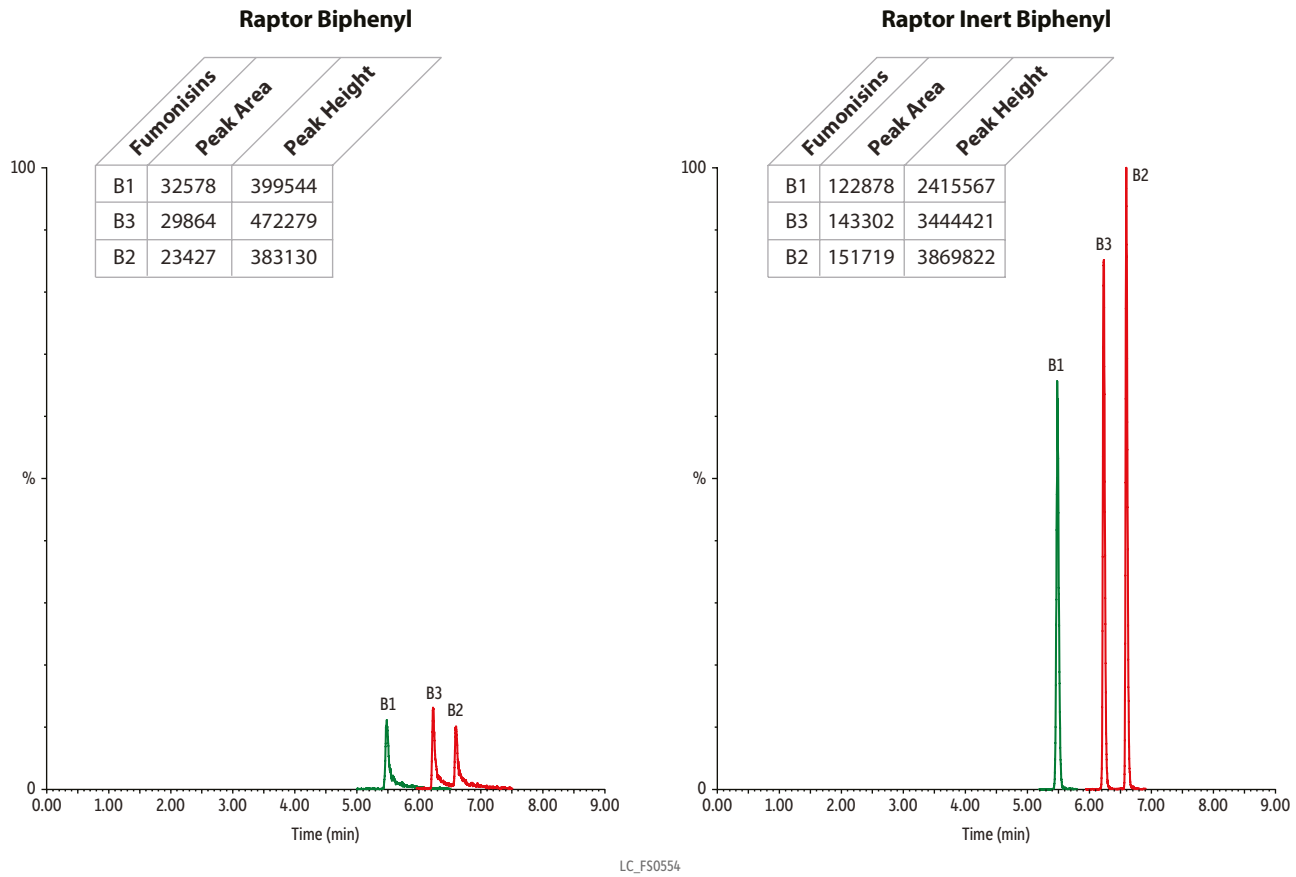


Figure 6: Peak area and peak height are greatly improved for the analysis of fumonisins.

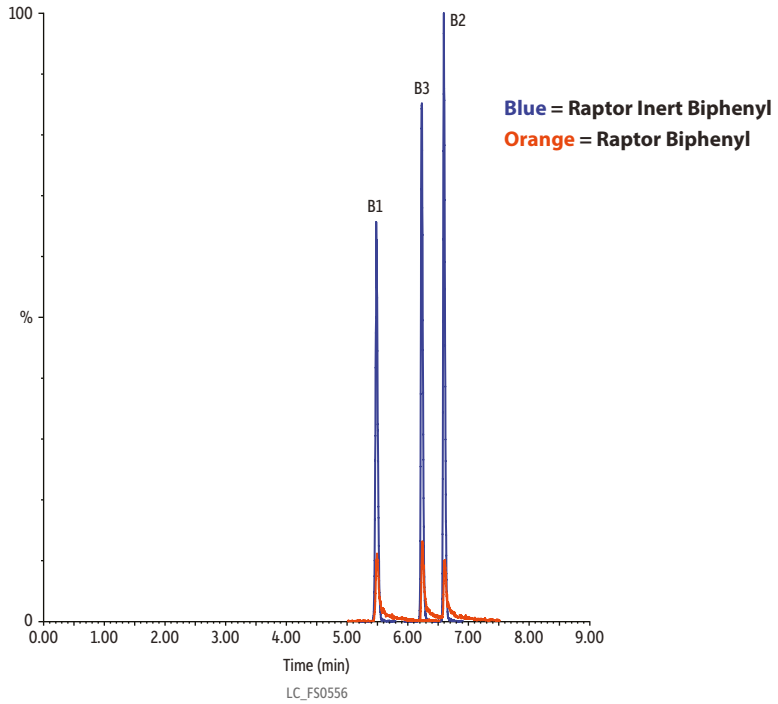


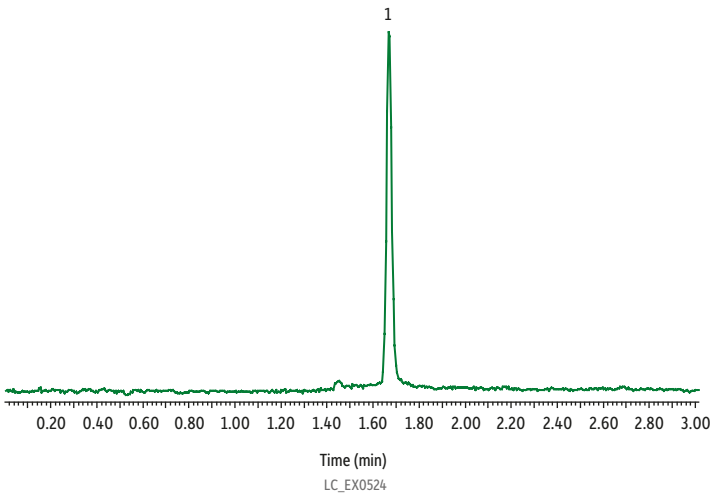
Table II: In this analysis of mycotoxins, our new inert columns can provide an up to 10x increase in peak height over conventional columns.

	Peak Area			Peak Height		
Compound	Stainless Steel	Inert	Areas Ratio (Inert/Stainless Steel)	Stainless Steel	Inert	Height Ratio (Inert/Stainless Steel)
Fumonisin B1	32578	122878	**3.77**	399544	2415567	**6.05**
Fumonisin B2	23427	151719	**6.48**	383130	3869822	**10.10**
Fumonisin B3	29864	143302	**4.80**	472279	3444421	**7.29**
Ergocristine	171197	195562	**1.14**	3865898	4450058	**1.15**
Ergocristinine	1393116	1583053	**1.14**	29212317	32975663	**1.13**
Ergotamine	433635	493003	**1.14**	8149518	9274156	**1.14**
Ergotaminine	397370	462119	**1.16**	7885403	9237991	**1.17**
Ergocryptine	446481	522204	**1.17**	9671753	11360839	**1.17**
Ergocryptinine	658788	778972	**1.18**	13680420	16765348	**1.23**
Ergocornine	370509	387025	**1.04**	7248981	7732744	**1.07**
Ergocorninine	590167	704029	**1.19**	12052359	14389283	**1.19**
Ergosine	445243	486620	**1.09**	8630932	9366602	**1.09**
Ergosinine	439026	496734	**1.13**	7820785	8740527	**1.12**
T-2	43286	56535	**1.31**	1046233	1394735	**1.33**
HT-2	10183	15221	**1.49**	216703	323765	**1.49**
Tentoxin	70973	95175	**1.34**	1577164	2131907	**1.35**
Ochratoxin	173686	190060	**1.09**	4039682	4411953	**1.09**
Diacetoxyscirpenol	47850	68139	**1.42**	846403	1208826	**1.43**
Fusarenone X	3865	7668	**1.98**	60409	121790	**2.02**
15-acetyl-DON	17055	31369	**1.84**	269862	517570	**1.92**
3-acetyldeoxyvinalenol	13353	22613	**1.69**	179204	296396	**1.65**
Aflatoxin G2	171597	262824	**1.53**	3429501	5274354	**1.54**
Aflatoxin G1	224058	304389	**1.36**	4607959	6102959	**1.32**
ZON	25617	37162	**1.45**	656915	927455	**1.41**
Aflatoxin B2	159389	295648	**1.85**	3462489	5724754	**1.65**
Aflatoxin B1	265935	223520	**0.84**	5335576	4425821	**0.83**
Alpha-zearalenol	16202	30224	**1.87**	382092	702420	**1.84**
Deoxynivalenol	6935	17346	**2.50**	117927	281906	**2.39**
Nivalenol	1790	4182	**2.34**	25276	64495	**2.55**
Altenuene	63224	113850	**1.80**	1187958	2059700	**1.73**
Alternariol monomethyl ether	19537	31024	**1.59**	428922	640689	**1.49**
Alternariol	48204	73272	**1.52**	837410	1302192	**1.56**
Citrinin	499900	1007880	**2.02**	5031182	9828890	**1.95**
Tenuazonic acid	21503	47828	**2.22**	89293	197658	**2.21**

Methylmalonic Acid

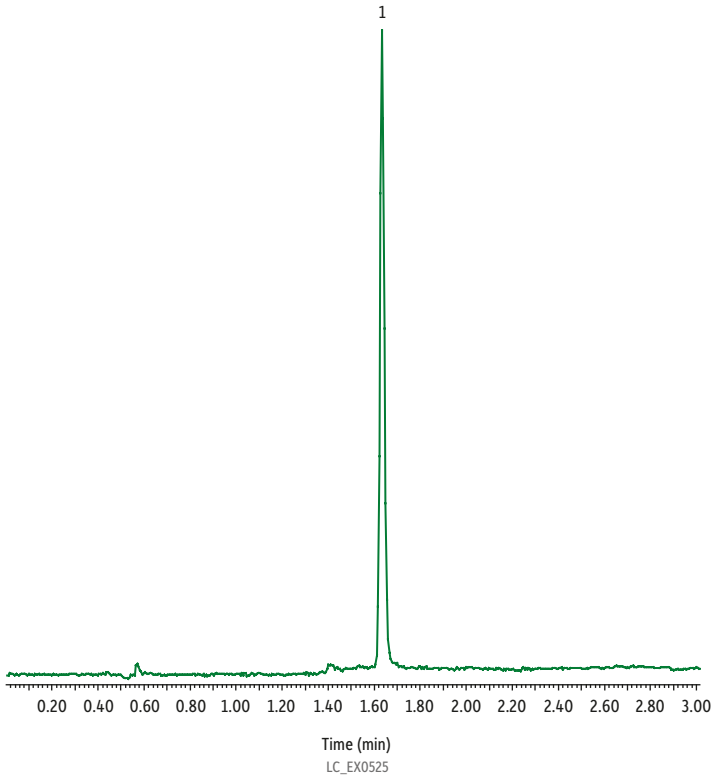
The analysis of methylmalonic acid is an important test for clinical laboratories in identifying vitamin B12 deficiency. When utilizing our inert hardware in testing for methylmalonic acid, a 40% improvement in sensitivity was achieved compared to regular hardware. A significant increase in methylmalonic acid peak area and peak height is shown for the inert hardware in Figure 7, below.

Figure 7: The Force Inert C18 column led to significant increases in sensitivity of methylmalonic acid compared to a conventional, stainless-steel column.



Force C18 (963431E)

Compound	Peak Area	Peak Height
1. Methylmalonic acid	7067232	225378



Force Inert C18 (963431E-T)

Compound	Peak Area	Peak Height
1. Methylmalonic acid	11682238	317358

Peaks	Precursor Ion	Product Ion
1. MMA	116.97	72.97

Column Temp.:	**35 °C**
Standard/Sample Diluent:	**50:50 Water:methanol**
Conc.:	**100 ng/mL**
Inj. Vol.:	**5 µL**
Mobile Phase A:	**Water, 0.5% formic acid**
B:	**Methanol, 0.5% formic acid**

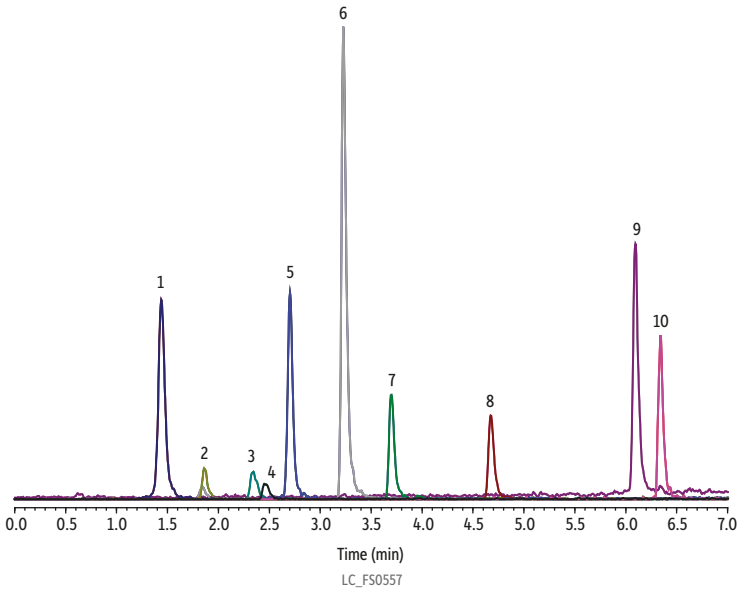
Time (min)	Flow (mL/min)	%A	%B
0.00	0.7	95	5
0.50	0.7	95	5
3.00	0.7	5	95
3.01	0.7	95	5
5.00	0.7	95	5

Detector	Waters Xevo TQ Absolute
Ion Source:	Waters Zspray ESI
Ion Mode:	ESI-
Mode:	MRM
Instrument	Waters ACQUITY Premier
Notes	Columns are: • Force C18 (cat.# 963431E) • Force Inert C18 (cat.# 963431E-T)

Veterinary Drugs

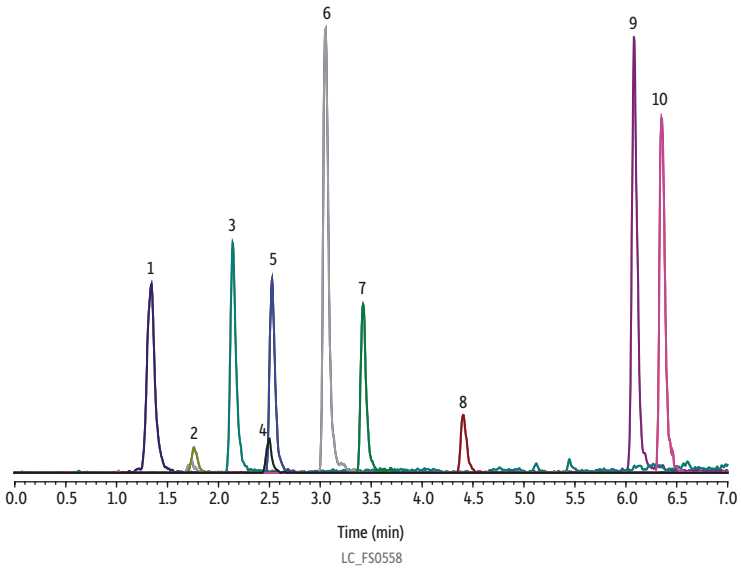
The identification of veterinary drugs in food samples, particularly in meats, fish, and eggs, is an important test for ensuring safe food products according to the guidelines outlined by the FDA and the EU. In the analysis of 10 common vet drugs, shown in Figure 8, dramatic increases in analyte responses were identified when utilizing the inert column compared to traditional, stainless-steel column.

Figure 8: Utilizing the Raptor Inert C18 column led to significant increases in analyte response of vet drugs compared to a conventional, stainless-steel column.



Raptor C18 (9304A12)

Compound	Peak Area	Peak Height
1. Lincomycin	182105	37507
2. Norfloxacin	21297	5705
3. Tulathromycin A	25782	5163
4. Cefazolin	13605	2864
5. Di¯oxacin	141725	38709
6. Pirlimycin	315970	88887
7. Gamithromycin	78366	19639
8. Erythromycin	66354	15749
9. Virginiamycin M1	169328	46359
10. Cloxacillin	112532	30894



Raptor Inert C18 (9304A12-T)

Compound	Peak Area	Peak Height
1. Lincomycin	317793	62086
2. Norfloxacin	30911	7462
3. Tulathromycin A	20025836	3319572
4. Cefazolin	32559	8317
5. Di¯oxacin	159342	43389
6. Pirlimycin	331811	83181
7. Gamithromycin	135167	32158
8. Erythromycin	147709	33521
9. Virginiamycin M1	345795	85851
10. Cloxacillin	307057	79591

Peaks	Precursor Ion	Product Ion
1. Lincomycin	407.00	359.00
2. Norfloxacin	320.00	276.00
3. Tulathromycin A	806.60	577.00
4. Cefazolin	455.00	323.00
5. Difloxacin	400.00	356.00
6. Pirlimycin	411.00	363.00
7. Gamithromycin	777.00	619.00
8. Erythromycin	734.00	576.00
9. Virginiamycin M1	526.00	508.00
10. Cloxacillin	436.00	277.05

Column
Temp.: 35 °C
Standard/Sample
Diluent: 50:50 methanol:water
Conc.: 10 ng/mL
Inj. Vol.: 2 µL
Mobile Phase
A: Water, 0.1% formic acid
B: Acetonitrile, 0.1% formic acid

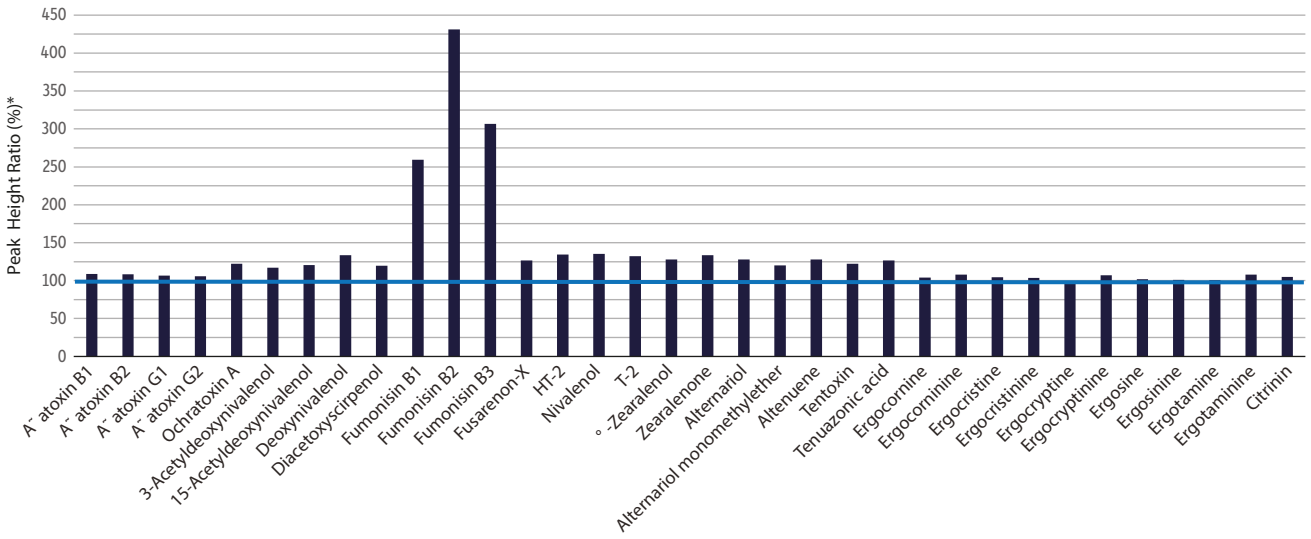
Time (min)	Flow (mL/min)	%A	%B
0.00	0.4	90	10
4.50	0.4	65	35
7.00	0.4	45	55
7.01	0.4	90	10
9.00	0.4	90	10

Detector Shimadzu 8060 MS/MS
Ion Source: Electrospray
Ion Mode: ESI+
Mode: MRM
Instrument Shimadzu Nexera X2
Notes Columns are:
• Raptor C18 (cat.# 9304A12)
• Raptor Inert C18 (cat.# 9304A12-T)

Enhance Performance and Protection with Inert Guards

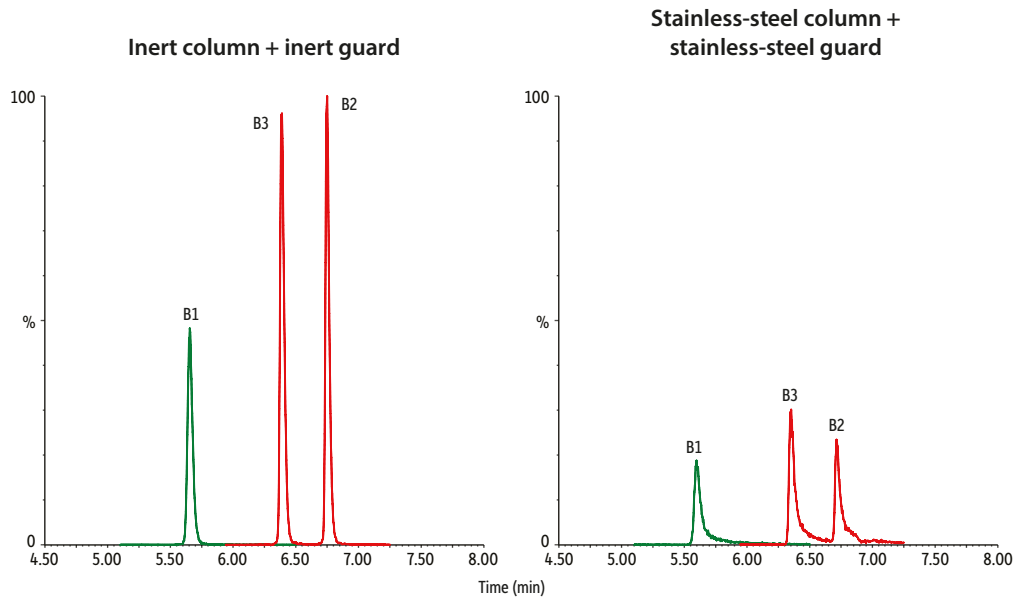
Our inert guard columns not only have the important job of providing protection to your LC system, they also boast improved performance in the analysis of metal-sensitive compounds. In this mycotoxin analysis, we assessed the improvements in analyte recovery and peak shape when utilizing an inert LC column and guard compared to a conventional stainless-steel column and guard. Figure 9 shows the relative peak height increase when switching from a stainless-steel column and guard to an inert column and guard, with increased recoveries in almost all compounds, most notably in the critical fumonisin B1, B2, and B3 compounds. Exceptional improvements in peak shape were also achieved when switching to inert hardware; Figure 10 shows the sharped peaks of fumonisin B1, B2, and B3 with inert hardware.

Figure 9: Notable increases in peak height were achieved when utilizing an inert LC column and guard compared to a stainless-steel LC column and guard.



* (Peak height using inert column and inert guard)/(Peak height using stainless-steel column and stainless-steel guard) x 100%

Figure 10: Figure 10: Drastic improvements in peak shape for fumonisin B1, B2, and B3 were achieved when using an inert LC columns paired with an inert guard column.



Exceptional Inertness Meets Exceptional Stationary Phases

We're introducing our inert LC column technology on three column types: Raptor Biphenyl, Raptor ARC-18, and Force Biphenyl. These new columns help bring the benefits of inert column technology to labs specializing in small molecule LC-MS/MS workflows.

Raptor LC Columns

Raptor LC columns combine the speed of 2.7 µm SPP with the resolution of Ultra Selective Liquid Chromatography (USLC) technology, improving separations and speeding up analysis times with standard HPLC instruments. When speed is your goal, Restek recommends the Raptor line of LC columns.

Learn more at www.restek.com/Raptor

Raptor Inert Biphenyl

This industry-leading Biphenyl is our most popular LC stationary phase. It is particularly adept at separating compounds that are hard to resolve or that elute early on C18 and other phenyl chemistries.

Raptor Inert C18

This traditional end-capped C18 offers the highest hydrophobic retention of any Raptor phase, and it is compatible with a wide range of mobile phases from moderately acidic to neutral (pH 2–8). Whether for food safety or environmental or bioanalytical analyses, this phase offers consistently excellent data quality in less time across myriad reversed-phase applications, matrices, and compound classes.

Raptor Inert ARC-18

The Raptor ARC-18 column features a well-balanced retention profile without the drawbacks of using an ordinary C18 in the harsh, acidic mobile phases needed for mass spectrometry. Even after extended use in these low-pH (≤ 2.0) conditions, the sterically protected ARC-18 offers consistent retention, peak shape, and response for charged bases, neutral acids, small polar compounds, and more.

Force LC Columns

Force fully porous particle (FPP) LC columns are designed and manufactured to handle high-pressure, high-stress conditions. They're long-lasting, reproducible, and premium quality—backed by our 100% Pure Satisfaction guarantee. When you need greater retention and sharper peaks, Force LC columns are ready to be put to work.

Learn more at www.restek.com/Force

Force Inert Biphenyl

The Force Inert Biphenyl column separates compounds that other phenyl and C18 chemistries can't. They allow the use of simple, MS-friendly mobile phases and are ideal for when you need to increase retention of hydrophilic aromatics.

Force Inert C18

The general-purpose Force Inert Restek C18 is a conventional monomeric octadecylsilane column suitable for analyses of a wide range of compounds from acidic through slightly basic.

Exceptional Inertness for Your Analysis

As chromatographers, we understand the importance of having confidence in your data. Whether you're analyzing pesticides, mycotoxins, or any analysis containing metal-sensitive compounds, these new LC columns provide the accuracy, throughput, and performance your lab needs.

Raptor Inert HPLC Columns

- Inert LC column technology reduces nonspecific binding of chelating analytes, enabling sensitive analysis and smooth integration of peaks.
- Increased response and analyte recovery, allowing lower detection limits.
- Improved peak shape without additional passivation or mobile phase additives.

Raptor Inert Biphenyl HPLC Columns



- Ideal for the analysis of metal-sensitive compounds, such as mycotoxins.
- Part of Restek's Raptor Biphenyl column line featuring 2.7 µm SPP core-shell silica.

ID	Length	Particle Size	Units	Cat.#
2.1 mm	100	2.7 µm	ea.	9309A12-T
3.0 mm	100	2.7 µm	ea.	9309A1E-T
2.1 mm	50	2.7 µm	ea.	9309A52-T
3.0 mm	50	2.7 µm	ea.	9309A5E-T

Raptor Inert C18 HPLC Columns



- Ideal for the analysis of metal-sensitive compounds.
- Part of Restek's Raptor Inert C18 column line featuring 2.7 µm SPP core-shell silica.

ID	Length	Particle Size	Units	Cat.#
2.1 mm	100 mm	2.7 µm	ea.	9304A12-T
2.1 mm	150 mm	2.7 µm	ea.	9304A62-T
2.1 mm	50 mm	2.7 µm	ea.	9304A52-T
3.0 mm	50 mm	2.7 µm	ea.	9304A5E-T
3.0 mm	100 mm	2.7 µm	ea.	9304A1E-T

Raptor Inert ARC-18 HPLC Columns



- Ideal for the analysis of metal-sensitive compounds, such as organophosphorus pesticides.
- Part of Restek's Raptor ARC-18 column line featuring 2.7 µm SPP core-shell silica.

ID	Length	Particle Size	Units	Cat.#
2.1 mm	100	2.7 µm	ea.	9314A12-T
3.0 mm	100	2.7 µm	ea.	9314A1E-T
2.1 mm	50	2.7 µm	ea.	9314A52-T
3.0 mm	50	2.7 µm	ea.	9314A5E-T

Contact your local Restek representative today at **www.restek.com/contact-us** to pair the benefits of our inert technology with your analysis.

Force Inert HPLC Columns

- Inert LC column technology reduces nonspecific binding of chelating analytes, enabling sensitive analysis and smooth integration of peaks.
- Increased response and analyte recovery, allowing lower detection limits.
- Improved peak shape without additional passivation or mobile phase additives.



Force Inert Biphenyl HPLC Columns

- Ideal for the analysis of metal-sensitive compounds, such as mycotoxins.
- Part of Restek's Force Biphenyl column line featuring 3 µm fully porous silica.

ID	Length	Particle Size	Units	Cat.#
2.1 mm	100	3 µm	ea.	9629312-T
3.0 mm	100	3 µm	ea.	962931E-T
2.1 mm	50	3 µm	ea.	9629352-T
3.0 mm	50	3 µm	ea.	962935E-T



Force Inert C18 HPLC Columns

- Ideal for the analysis of metal-sensitive compounds.
- Part of Restek's Fore Inert C18 column line featuring 1.8 and 3 µm fully porous silica.

ID	Length	Particle Size	Units	Cat.#
2.1 mm	50 mm	1.8 µm	ea.	9634252-T
2.1 mm	100 mm	1.8 µm	ea.	9634212-T
2.1 mm	100 mm	3 µm	ea.	9634312-T
3.0 mm	100 mm	3 µm	ea.	963431E-T
2.1 mm	50 mm	3 µm	ea.	9634352-T
3.0 mm	50 mm	3 µm	ea.	963435E-T





Inert Guard Column Cartridges

- Premium inert coating reduces nonspecific binding of chelating analytes.
- Free-Turn architecture lets you change cartridges by hand without breaking inlet/outlet fluid connections—no tools needed.
- Patented titanium hybrid ferrules can be installed repeatedly without compromising high-pressure seal.
- Auto-adjusting design provides ZDV (zero dead volume) connection to any 10-32 female port.
- Guard column cartridges require EXP direct connect holder (cat.# 25808).
- Pair with EXP hand-tight fitting (cat.# 25937–25938) for tool-free installation.

Product Name	Cat.#
Raptor Inert Biphenyl 2.7 µm EXP Guard Column Cartridge 5 x 2.1 mm, 3-pk.	9309A0252-T
Raptor Inert Biphenyl 2.7 µm EXP Guard Column Cartridge 5 x 3.0 mm, 3-pk.	9309A0253-T
Raptor Inert ARC-18 2.7 µm EXP Guard Column Cartridge 5 x 2.1 mm, 3-pk.	9314A0252-T
Raptor Inert ARC-18 2.7 µm EXP Guard Column Cartridge 5 x 3.0 mm, 3-pk.	9314A0253-T
Force Inert Biphenyl EXP Guard Cartridge 5 x 2.1 mm, 3-pk.	962950252-T
Force Inert Biphenyl EXP Guard Cartridge 5 x 3.0 mm, 3-pk.	962950253-T
Raptor Inert C18 2.7 µm EXP Guard Column Cartridge 5 x 2.1 mm, 3-pk.	9304A0252-T
Raptor Inert C18 2.7 µm EXP Guard Column Cartridge 5 x 3.0 mm, 3-pk.	9304A0253-T
Force Inert C18 EXP Guard Column Cartridge 5 x 2.1 mm, 3-pk.	963450252-T
Force Inert C18 EXP Guard Column Cartridge 5 x 3.0 mm, 3-pk	963450253-T

LC Passivation Solution



Used to passivate your LC system before your first analysis if you:

(a) are analyzing phosphorylated compounds or other polar molecules known to chelate or interact with metal ions in your LC (e.g., glyphosate);

and also

(b) have stainless steel in your instrument flow path.

Methylenediphosphonic acid (Medronic Acid) (1984-15-2)

Conc. in Solvent	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
1760 µg/mL, Methanol (HPLC grade)/ Water (50:50), 1 mL/ampul	6 months	36 months	Ambient	10 °C or colder	ea.	32475

LC Multiresidue Pesticide Kit

- Accurately detect and quantify pesticides of global food safety concern in a wide range of fruits, vegetables, and other commodities by LC-MS/MS.
- Full kit contains 204 compounds of interest, covering many LC-determined pesticides listed by government agencies; individual ampuls also sold separately.



Cat.# 31972: LC Multiresidue Pesticide Standard #1 (13 components)
Organophosphorus Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31973: LC Multiresidue Pesticide Standard #2 (16 components)
Carbamate/Uron Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31974: LC Multiresidue Pesticide Standard #3 (38 components)
Carbamate/Uron Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31975: LC Multiresidue Pesticide Standard #4 (63 components)
Organonitrogen Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31976: LC Multiresidue Pesticide Standard #5 (30 components)
Organonitrogen Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31977: LC Multiresidue Pesticide Standard #6 (28 components)
Organonitrogen Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31978: LC Multiresidue Pesticide Standard #7 (7 components)
Organonitrogen Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31979: LC Multiresidue Pesticide Standard #8
Organonitrogen Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31980: LC Multiresidue Pesticide Standard #9 (7 components)
Carbamate/Uron Compounds
100 µg/mL each in acetonitrile, 1 mL/ampul

Cat.# 31981: LC Multiresidue Pesticide Standard #10
Carbamate/Uron Compounds
100 µg/mL each in methanol, 1 mL/ampul

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
Contains 1 mL each of these mixtures.	Yes	6 months	On Ice	–20 °C or colder	kit	31971

* Note: When combining a large number of compounds with different chemical functionalities, mix stability can be an issue. In formulating these standards, we extensively studied the 204 compounds involved, then grouped them into as few mixes as possible while still ensuring maximum long-term stability and reliability. For quantitative analysis, we recommend analyzing each mix separately to ensure accurate results for every compound.
** Note: In this standard, fluazinam should only be used for qualitative analysis. A single-component standard (cat.# 31982) is available for quantitative analysis.



Aflatoxins (B1, B2, G1, G2) Standard

(4 components)

Ideal for mycotoxin analyses in cannabis and food testing labs.

Aflatoxin B1 (1162-65-8)
Aflatoxin B2 (7220-81-7)
Aflatoxin G1 (1165-39-5)
Aflatoxin G2 (7241-98-7)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	Data pack available?	qty.	cat.#
10 µg/mL, Acetonitrile, 1 mL/ampul	Yes	6 months	36 months	On Ice	0 °C or colder	No	ea.	34121

Ochratoxin A Standard

Ideal for mycotoxin analyses in cannabis and food testing labs.

Ochratoxin A (303-47-9)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	Data pack available?	qty.	cat.#
10 µg/mL, Acetonitrile, 1 mL/ampul	Yes	6 months	36 months	On Ice	0 °C or colder	No	ea.	34122

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