How to Maximize Performance with Restek's
Inert LC Columns and Guards

- Are you struggling with poor peak shape?
- Experiencing low sensitivity?
- Performing extensive conditioning steps to achieve reproducible peak intensity?

If you answered yes to any of these, we may have a solution for you!

Analytes that are metal-sensitive, or chelating, (including polar components or apolar components with polar functional groups), can adversely react with stainless steel surfaces in your column, leading to poor peak shape and low sensitivity. Performing extensive conditioning steps just to achieve satisfactory results or having to rerun analyses reduces efficiencies and increases laboratory costs.

Restek's inert column technology can provide a solution to poor peak shape and poor response 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. Our robust inert coating combined with well-established selective stationary phases provides optimum results to a wide range of applications, particularly for trace analysis.

Which Compounds Can Benefit from Inert Technology?

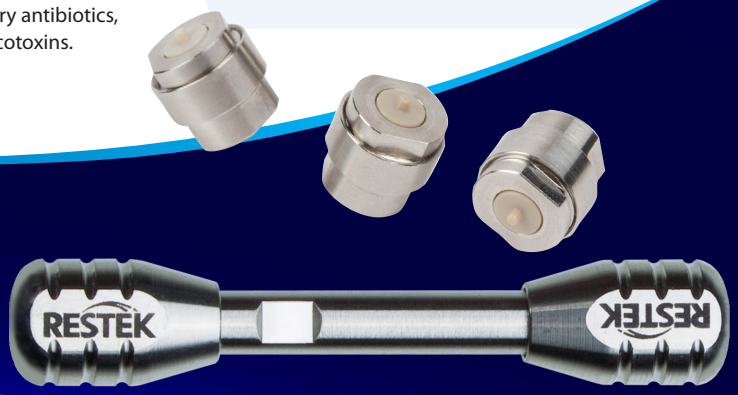
- Phosphorylated Compounds
- Acidic Analytes
- Biomolecules–Proteins
- Metal Coordinating Small Molecules

Examples include ultra-short chain PFAS, bile acids, veterinary antibiotics, methylmalonic acid, organophosphorus pesticides, and mycotoxins.

Restek's Inert columns and guards provide:

- **A permanent solution** to eliminate compound adsorption/ binding metal surfaces.
- **Improved peak shape** without passivation or mobile phase additives.
- **Increased response and analyte recovery** for lower detection limits.
- **High accuracy and throughput** with less variability.

INERT



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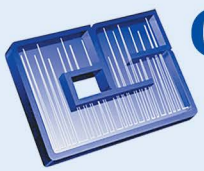

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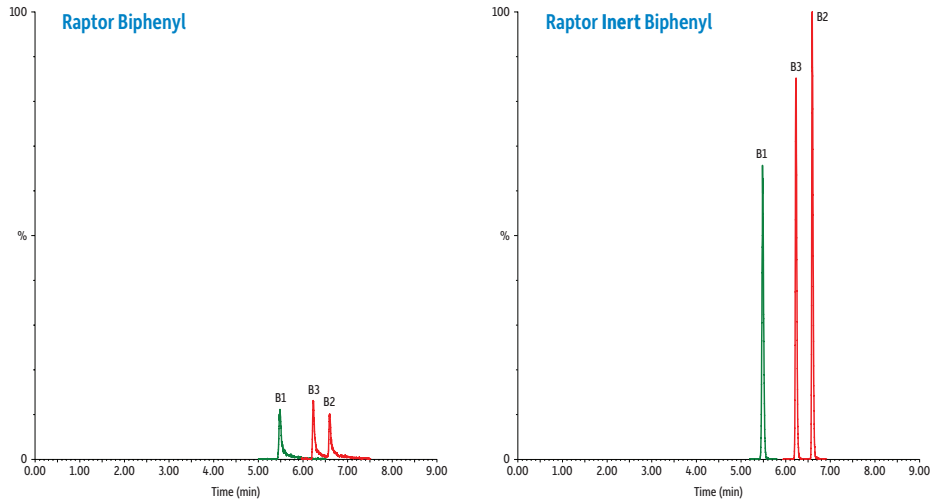
See the Benefits of Our Inert Columns and Guards

Example 1: Improved Fumonisin B Reponse for Greater Accuracy in Mycotoxin Analyses

In this mycotoxins analysis, significant improvements in response were observed for all three fumonisin B isomers when using an inert column compared to a traditional stainless-steel column (see Figure 1). After switching to an inert column, an up to a tenfold increase for signal height and an up to a seven-fold increase in signal area was observed.

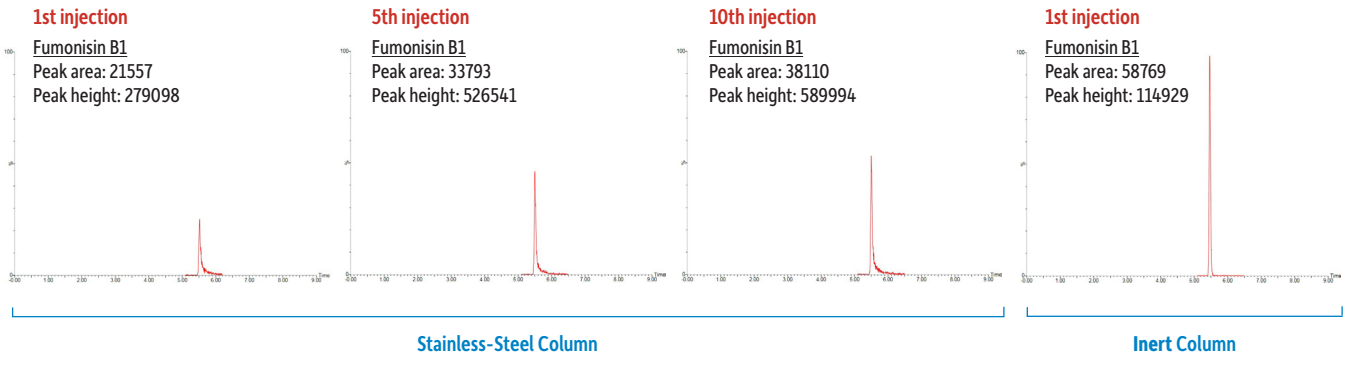
Figure 1: Comparison of Fumonisin B on a Conventional Stainless-Steel and Inert Column
Inert technology significantly improves response of fumonisin B.



To view the detailed chromatogram and method conditions, search for "LC_FS0554" on www.restek.com with "Chromatograms" selected in the drop-down menu.

When analyzing fumonisin B using a traditional, stainless-steel column, chemical passivation and column conditioning are needed to achieve reproducible results (see Figure 2). When utilizing inert column technology, excellent response and peak shape is achieved from the very first injection, thus eliminating the need for time- consuming passivation.

Figure 2: Comparison of Sample Passivation versus Inert Column Hardware
Reproducible results are achieved with our inert columns right out of the box without the need for time-consuming and complicated passivation procedures.

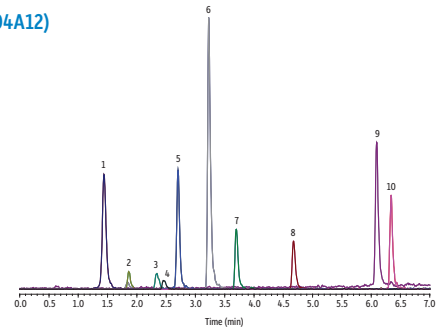


Example 2: Dramatic Increase in Sensitivity in Veterinary Drug Analysis Using Inert Technology

In this analysis of veterinary drugs, dramatic improvements in peak height and area were observed when switching from a stainless-steel column to an inert column. Shown in Figure 3, below, the tulathromycin peak is 646 times taller with 777 times more peak area when using inert hardware! Notable improvements were also achieved for other target compounds in this analysis.

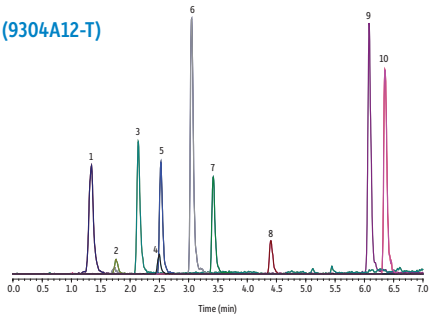
Figure 3: Comparison of Veterinary Drugs Analysis on a Conventional, Stainless-Steel and Inert Column

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. Difloxacin	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)



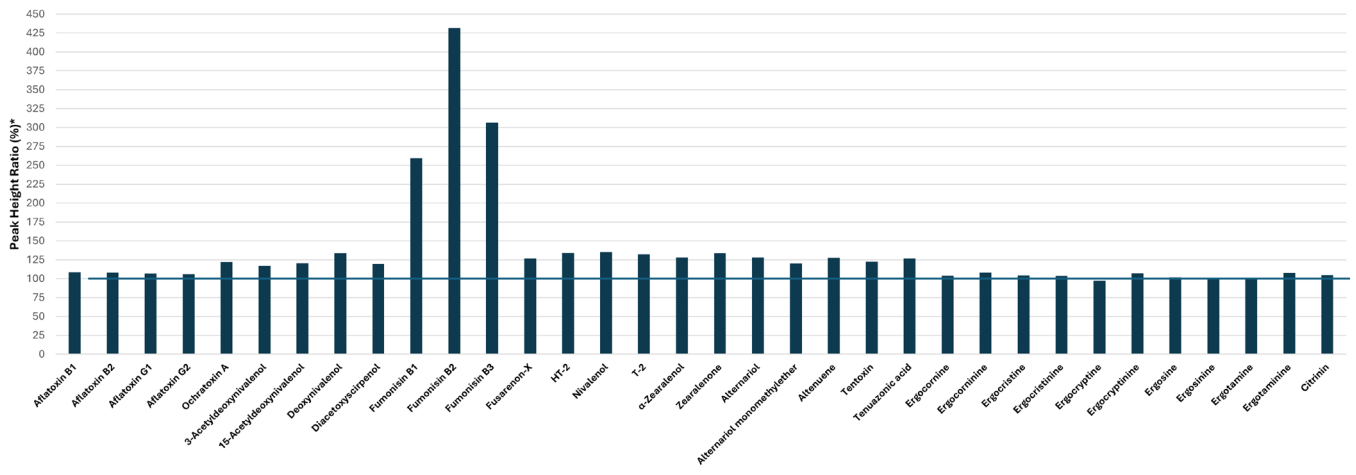
Compound	Peak Area	Peak Height
1. Lincomycin	317793	62086
2. Norfloxacin	30911	7462
3. Tulathromycin A	20025836	3319572
4. Cefazolin	32559	8317
5. Difloxacin	159342	43389
6. Pirlimycin	331811	83181
7. Gamithromycin	135167	32158
8. Erythromycin	147709	33521
9. Virginiamycin M1	345795	85851
10. Cloxacillin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

To view the detailed chromatogram and method conditions, search for "LC_FS0557" on www.restek.com with "Chromatograms" selected in the drop-down menu.

Pair Your Inert Columns with an Inert Guard for Even Greater Benefits

Our inert guard columns not only have the important job of providing column protection, but they also lead to even greater analyte recoveries and improvements in peak shape for metal-sensitive compounds by further increasing the inert surfaces in your LC system. Figure 4 shows the relative peak area increase when switching from a stainless-steel column and guard to an inert column and guard.

Figure 4: 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)*100%
Note: An improvement is indicated by peak height ratios above the blue line in the graph above.

Which Inert Column is Right for You?

Restek's inert LC column technology is available in various phases to accommodate a wide range of applications and testing methodologies. Explore which phase is right for your analysis in the chart below.

Table I: Benefits and Suggested Applications of Restek's Various Inert Columns

Column Line	Analytes to Consider for Inert	Key Benefits	Catalog Numbers	ID	L	dp
Raptor ARC-18	pesticides; cannabinoids (hemp analysis); flavonoids; pyrrolizidine alkaloids; amino acids (FMOC); vitamins (fat-soluble)	This phase is acid-resistant and can be used to a pH of 1. Furthermore, it has a well-balanced retention profile that makes it a great choice for multicomponent analysis.	9314A12-T	2.1 mm	100 mm	2.7 µm
			9314A1E-T	3.0 mm	100 mm	2.7 µm
			9314A52-T	2.1 mm	50 mm	2.7 µm
			9314A5E-T	3.0 mm	50 mm	2.7 µm
Raptor Biphenyl	mycotoxins, all kinds of drug and pharmaceutical panels and metabolites, cannabinoids, bisphenols, sweeteners, nitrosamines	Besides hydrophobicity, this phase shows strong interactions with π-electrons that are present in unsaturated functional groups, especially aromatics. This makes it a great alternative to C18 phases, whenever better or different separation is needed. Moreover, it can be used with 100% aqueous mobile phases and retains polar aromatics much better than C18.	9309A12-T	2.1 mm	100 mm	2.7 µm
			9309A1E-T	3.0 mm	100 mm	2.7 µm
			9309A52-T	2.1 mm	50 mm	2.7 µm
			9309A5E-T	3.0 mm	50 mm	2.7 µm
Raptor C18	PFAS; nitrosamines; aldehyde and ketone (DNPH); d & l amphetamines (DNPA); morpholine fungicides; antibiotics; bile acids; veterinary drugs and barbiturates; flavonols; herbicides; parabens	Classical C18 with classical TMS endcapping. Universally usable for all sorts of applications with long column lifetime and excellent separation.	9304212-T	2.1 mm	100 mm	1.8 µm
			9304A12-T	2.1 mm	100 mm	2.7 µm
			9304A1E-T	3.0 mm	100 mm	2.7 µm
			9304252-T	2.1 mm	50 mm	1.8 µm
			9304A52-T	2.1 mm	50 mm	2.7 µm
			9304A5E-T	3.0 mm	50 mm	2.7 µm
			9304A62-T	2.1 mm	150 mm	2.7 µm
Force Biphenyl	alcohol metabolites (EtG/EtS); alkaloids in psychedelic mushsrooms; barbiturates & THC; steroids	The selectivity is the same as of Raptor Biphenyl, whereas Raptor is a Core-Shell column–best choice for sharp peaks–and Force is a classical fully porous column–best choice if more retention is needed or higher analyte or matrix loadability.	9629312-T	2.1 mm	100 mm	2.7 µm
			962931E-T	3.0 mm	100 mm	3.0 µm
			9629352-T	2.1 mm	50 mm	3.0 µm
			962935E-T	3.0 mm	50 mm	3.0 µm
Force C18	GHB and related compounds, methyl malonic acid, flavanones, steroids	The selectivity is the same as of Raptor C18, whereas Raptor is a Core-Shell column–best choice for sharp peaks–and Force is a classical fully porous column–best choice if more retention is needed or higher analyte or matrix loadability.	9634212-T	2.1 mm	100 mm	1.8 µm
			9634312-T	2.1 mm	100 mm	3.0 µm
			963431E-T	3.0 mm	100 mm	3.0 µm
			9634252-T	2.1 mm	50 mm	1.8 µm
			9634352-T	2.1 mm	50 mm	3.0 µm
			963435E-T	3.0 mm	50 mm	3.0 µm

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