

Zebron PLUS GC Inlet Liners

Remarkably Inert

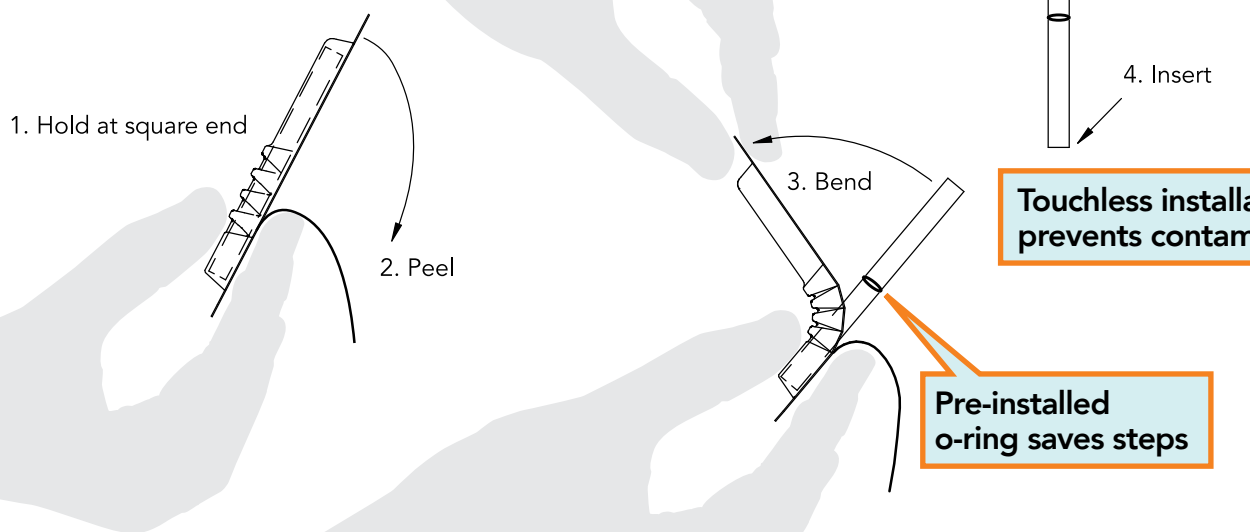


- Superior sample protection
- Easy to install
- A solution for all of your analyses



Safe and Simple Installation

No more broken or contaminated liners! Easy to open, easy to install Zebron PLUS liner packaging allows you to protect yourself from cuts or breakage while reducing any contamination that may occur during the installation process.



Choose Your Liner



We've made it easier than ever to find your ideal GC liner! Simply follow the selection chart below, use your current liner part number, or visit us online.

1. Find by GC System

Agilent®.....	p.6
Thermo Scientific®.....	p.6
PerkinElmer®.....	p.7
Shimadzu®	p.8

2. Find by Your Current Liner Part Number..... p.9

3. Find Your Ideal GC Liner Online! Search by:



www.phenomenex.com/FindLiner

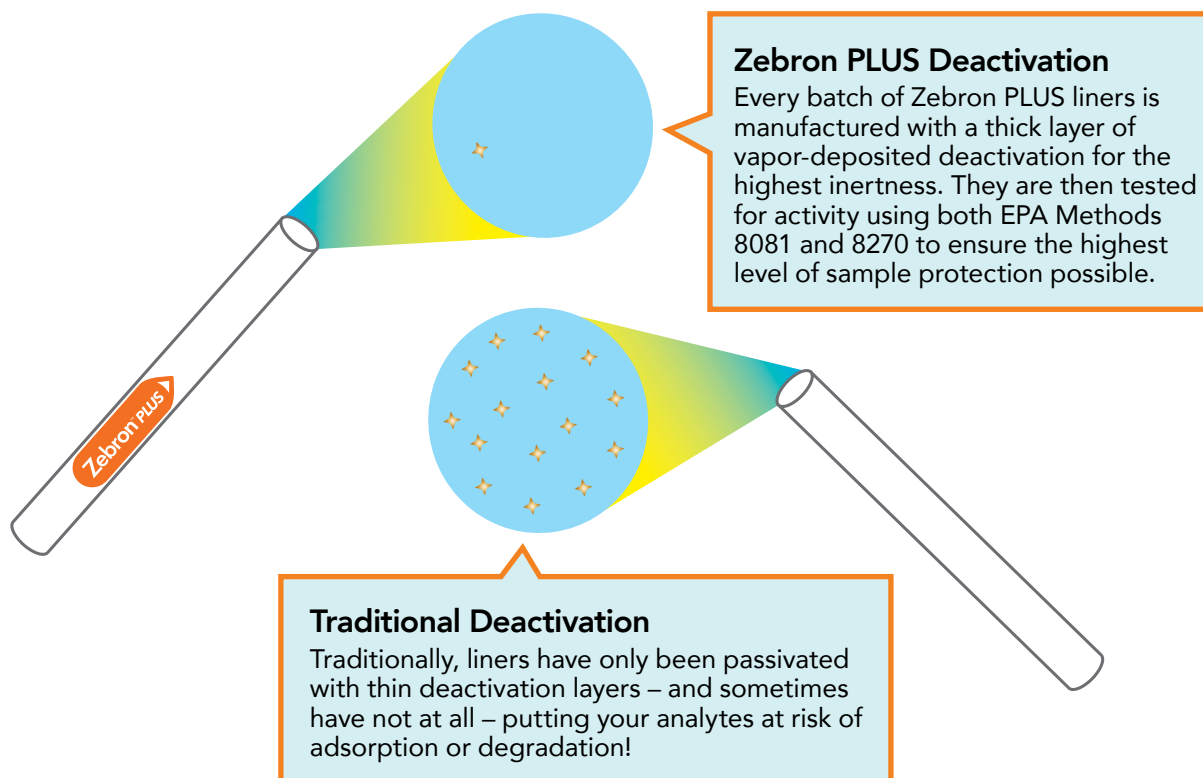
Become A GC Liner Expert

- p. 10** Tips To Improve Your Analysis
- p. 12** Frequently Asked Questions
- p. 14** Meet The Zebron Family

Deactivation Protects Your Samples

Zebron PLUS GC inlet liners undergo a unique deactivation process, resulting in a remarkably inert pathway that prevents sample adsorption and degradation for active compounds.

See The Difference: Zebron PLUS vs. Traditional Deactivation



Wool Enhances Your Analysis








Analysis of dirty samples, samples with wide boiling points, or samples with wide molecular weights can be enhanced by choosing a Zebron PLUS liner with quartz wool. Liners packed with wool can prevent non-volatile compounds from entering the column and also improve sample vaporization for a more robust, reproducible analysis.

Why Use Pre-Packed Liners?

Though the upfront cost of self-packing your liner may seem attractive, the time and headaches caused by resulting tailing or irreproducible peaks can be sizeable! Self-packed wool fibers commonly break during installation and any existing deactivation on the liner can also be scratched or damaged. Pre-packed Zebron PLUS liners undergo the deactivation process with the quartz wool already in place, which ensures that any active sites that form during packing are not exposed.

Liner Geometry Improves Performance

The geometry of a liner refers to the type and shape of a liner. Each geometry addresses a particular sample or injection type. Use the chart below to determine the best geometry for your sample.

	Injection Type			Primary Challenge						
	Split	Splitless	Direct	Trace Analysis	Active Compounds	Concentrated Samples	Dirty Samples	Gaseous Samples (e.g. headspace, purge and trap)	Wide Boiling Point Range	General Purpose
Straight 	●					●	●	●		●
Straight Z-Liner™ 	●					●	●			●
Single Taper 		●		●	●					●
Single Taper with Wool 	●	●		●		●	●			●
Single Taper Z-Liner 	●	●		●			●		●	●
Direct Connect 			●	●	●					●
Single Baffle 	●	●		●						






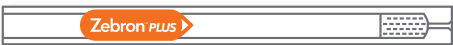



It is important to ensure that your liner has the proper dimensions for your analysis. If the liner volume is too low, your sample may not fit in the liner after it is vaporized due to expansion. This can result in irreproducible peaks and carryover.

What's A Z-Liner?


Zebon PLUS liners with a Z-Liner geometry contain optimally-placed deactivated quartz wool, which is held in place by two tapered sections of glass inside the liner. This ensures that the wool remains in the correct position for injection, wipes the needle tip completely clean, and properly volatilizes the sample.


For Agilent® or Thermo Scientific® GC Systems

Ordering Information

Description	Application	Dimensions ID x L (mm)	Part No.	Unit	Price
Direct Connect 	Trace analysis	4 x 78.5	AG2-0A50-01	Ea	
	Splitless injections		AG2-0A50-05	5/pk	
			AG2-0A50-25	25/pk	
Single Taper 	Pesticides	4 x 78.5	AG2-0A10-01	Ea	
			AG2-0A10-05	5/pk	
			AG2-0A10-25	25/pk	
Single Taper Z-Liner™ 	Semi-volatiles	4 x 78.5	AG2-0A13-01	Ea	
	Dirty samples		AG2-0A13-05	5/pk	
			AG2-0A13-25	25/pk	
Single Taper with Wool 	Semi-volatiles	4 x 78.5	AG2-0A11-01	Ea	
			AG2-0A11-05	5/pk	
			AG2-0A11-25	25/pk	
Straight 	Volatiles	4 x 78.5	AG2-0A00-01	Ea	
			AG2-0A00-05	5/pk	
			AG2-0A00-25	25/pk	
Straight Z-Liner 	Dirty samples	4 x 78.5	AG2-0A03-01	Ea	
	Volatiles		AG2-0A03-05	5/pk	
	High initial oven temperatures		AG2-0A03-25	25/pk	
Straight Single Baffle 	Semi-volatiles	1.8 x 71	AG2-1F06-01	Ea	
	Pesticides		AG2-1F06-05	5/pk	
			AG2-1F06-25	25/pk	


Complete Your Analysis

Easy Seals Inlet Base Seals				2/pk	10/pk		
Description	Injection Type	Groove Style	Inlet Hole Diameter (mm)	Part No.	Price	Part No.	Price
Easy Seals Gold Inlet Seal 	Splitless	Single	0.8	AG0-8619		AG0-8620	


Description		Diameter (mm)	(in.)	Includes GuideRight™ Hole	Part No.	Unit	Price
PhenoRed™ -400 Septa 	<ul style="list-style-type: none"> Our most popular choice for low-bleed septa, rated to 400 °C Designed and conditioned for high sensitivity Durometer rating of 50 with typical injection life of 150 punctures 	9.5	3/8	✓	AG0-7916	50/pk	
		11	7/16	✓	AG0-7917	50/pk	

For PerkinElmer® GC Systems

Ordering Information

Description	Application	Dimensions ID x L (mm)	Part No.	Unit	Price
Single Taper 	Pesticides	4 x 92	AG2-2A10-01	Ea	
			AG2-2A10-05	5/pk	
			AG2-2A10-25	25/pk	
Single Taper Z-Liner™ 	Semi-volatiles	4 x 92	AG2-2A13-01	Ea	
	Dirty samples		AG2-2A13-05	5/pk	
			AG2-2A13-25	25/pk	
Straight 	Volatiles	4 x 92	AG2-2A00-01	Ea	
			AG2-2A00-05	5/pk	
			AG2-2A00-25	25/pk	
Straight Z-Liner 	Volatiles	2 x 86.2	AG2-2E03-01	Ea	
	Dirty samples		AG2-2E03-05	5/pk	
			AG2-2E03-25	25/pk	
Straight Z-Liner 	High initial oven temperatures	4 x 92	AG2-2A03-01	Ea	
			AG2-2A03-05	5/pk	
			AG2-2A03-25	25/pk	

Complete Your Analysis

Description	Diameter		Includes GuideRight™ Hole	Part No.	Unit	Price
	(mm)	(in.)				
PhenoRed™ -400 Septa  <ul style="list-style-type: none"> • Our most popular choice for low-bleed septa, rated to 400°C • Designed and conditioned for high sensitivity • Durometer rating of 50 with typical injection life of 150 punctures 	9.5	3/8	✓	AG0-7916	50/pk	
	11	7/16	✓	AG0-7917	50/pk	









More Inlet Consumables Are Available Online!

Need inlet seals, septa, or syringes? Explore hundreds of available parts online at


www.phenomenex.com/InletGC

Zebtron™ PLUS Inlet Liners For Shimadzu® GC Systems

Ordering Information

Description	Application	Dimensions ID x L (mm)	Part No.	Unit	Price
Shimadzu 17A GC Systems					
Single Taper Z-Liner™ 	Pesticides	3.4 x 95	AG2-3B13-01	Ea	
			AG2-3B13-05	5/pk	
			AG2-3B13-25	25/pk	
Straight Z-Liner 	Volatiles	3.4 x 95	AG2-3B03-01	Ea	
	Dirty samples		AG2-3B03-05	5/pk	
	High initial oven temperatures		AG2-3B03-25	25/pk	
Shimadzu 2010 GC Systems					
Single Taper Liner 	Pesticides	3.4 x 95	AG2-4B10-01	Ea	
			AG2-4B10-05	5/pk	
			AG2-4B10-25	25/pk	
Single Taper Z-Liner 	Semi-volatiles	3.4 x 95	AG2-4B13-01	Ea	
	Dirty samples		AG2-4B13-05	5/pk	
			AG2-4B13-25	25/pk	
Straight Liner 	Volatiles	3.4 x 95	AG2-4B00-01	Ea	
			AG2-4B00-05	5/pk	
			AG2-4B00-25	25/pk	
Straight Z-Liner 	Volatiles	3.4 x 95	AG2-4B03-01	Ea	
	Dirty samples		AG2-4B03-05	5/pk	
	High initial oven temperatures		AG2-4B03-25	25/pk	

Complete Your Analysis

Description	Part No.	Unit	Price
BTO® Silicone Septa Plug  <ul style="list-style-type: none"> Fits Shimadzu (9A, 14, 15A, 17A, 2010) and SRI injectors Rated to 400°C 	AG0-7517	50/pk	

guarantee

If Zebtron PLUS GC Inlet Liners do not provide you with equivalent or better separations as compared to any other GC inlet liners of the same geometry and comparable dimensions, return the liners with comparative data within 45 days for a FULL REFUND.

Liner Cross-Reference Guide

Liner Part Number

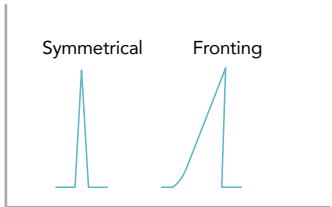
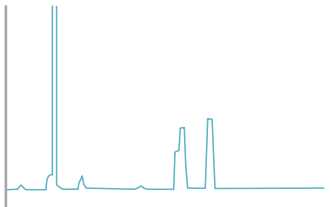
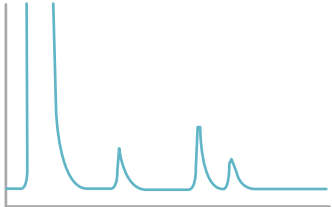
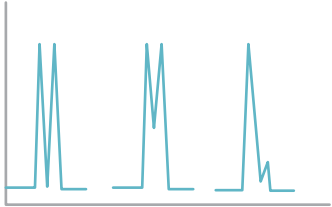
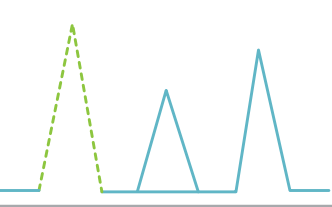
Geometry	Instrument	ID (mm)	Length (mm)	Unit	Restek® Sky®	Restek	Agilent Ultra Inert	Agilent	Zebtron™ PLUS
Straight	Agilent® / Thermo Scientific®	4	78.5	5/pk	23301.5	20782-214.5		210-3003-5	AG2-0A00-05
Straight	Agilent / Thermo Scientific	4	78.5	25/pk	23301.25	20783-214.25			AG2-0A00-25
Straight Z-Liner™	Agilent / Thermo Scientific	4	78.5	5/pk	23305.5			210-4004-5	AG2-0A03-05
Straight Z-Liner	Agilent / Thermo Scientific	4	78.5	25/pk	23305.25				AG2-0A03-25
Single Taper	Agilent / Thermo Scientific	4	78.5	5/pk	23302.5		5190-3162	5183-4695	AG2-0A10-05
Single Taper	Agilent / Thermo Scientific	4	78.5	25/pk	23302.25		5190-3166	5183-4696	AG2-0A10-25
Single Taper with Wool	Agilent / Thermo Scientific	4	78.5	5/pk	23303.5		5190-3163	5183-4693	AG2-0A11-05
Single Taper with Wool	Agilent / Thermo Scientific	4	78.5	25/pk	23303.25		5190-3167	5183-4694	AG2-0A11-25
Single Taper Z-Liner	Agilent / Thermo Scientific	4	78.5	5/pk		22984		210-4022-5	AG2-0A13-05
Single Taper Z-Liner	Agilent / Thermo Scientific	4	78.5	25/pk		22985			AG2-0A13-25
Direct Connect	Agilent / Thermo Scientific	4	78.5	5/pk					AG2-0A50-05
Direct Connect	Agilent / Thermo Scientific	4	78.5	25/pk					AG2-0A50-25
Straight	PerkinElmer®	4	92	5/pk					AG2-2A00-05
Straight	PerkinElmer	4	92	25/pk					AG2-2A00-25
Straight Z-Liner	PerkinElmer	4	92	5/pk	23450.5				AG2-2A03-05
Straight Z-Liner	PerkinElmer	4	92	25/pk					AG2-2A03-25
Single Taper	PerkinElmer	4	92	5/pk					AG2-2A10-05
Single Taper	PerkinElmer	4	92	25/pk					AG2-2A10-25
Single Taper Z-Liner	PerkinElmer	4	92	5/pk					AG2-2A13-05
Single Taper Z-Liner	PerkinElmer	4	92	25/pk					AG2-2A13-25
Straight Z-Liner	PerkinElmer (PSS Injector)	2	86.2	5/pk					AG2-2E03-05
Straight Z-Liner	PerkinElmer (PSS Injector)	2	86.2	25/pk					AG2-2E03-25
Straight Z-Liner	Shimadzu® 17A	3.4	95	5/pk	23320.5				AG2-3B03-05
Straight Z-Liner	Shimadzu 17A	3.4	95	25/pk					AG2-3B03-25
Single Taper Z-Liner	Shimadzu 17A	3.4	95	5/pk	23455.5				AG2-3B13-05
Single Taper Z-Liner	Shimadzu 17A	3.4	95	25/pk					AG2-3B13-25
Straight	Shimadzu 2010	3.4	95	5/pk	23318.5				AG2-4B00-05
Straight	Shimadzu 2010	3.4	95	25/pk	23318.25				AG2-4B00-25
Straight Z-Liner	Shimadzu 2010	3.4	95	5/pk	23320.5				AG2-4B03-05
Straight Z-Liner	Shimadzu 2010	3.4	95	25/pk					AG2-4B03-25
Single Taper	Shimadzu 17A / 2010	3.4	95	5/pk	23321.5			8001-0104	AG2-4B10-05
Single Taper	Shimadzu 17A / 2010	3.4	95	25/pk	23321.25				AG2-4B10-25
Single Taper Z-Liner	Shimadzu 2010	3.4	95	5/pk	23455.5				AG2-4B13-05
Single Taper Z-Liner	Shimadzu 2010	3.4	95	25/pk					AG2-4B13-25
Straight Single Baffle	Agilent PTV	1.8	71	5/pk	23432.10 (10/pk)				AG2-1F06-05
Straight Single Baffle	Agilent PTV	1.8	71	25/pk					AG2-1F06-25

Find Your Liner Online!

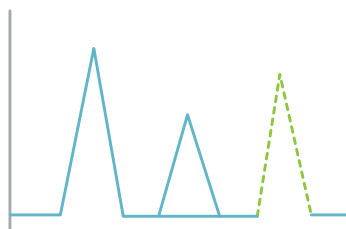
Easily search by part numbers, application, injection mode, or system manufacturer for quick selection in under 1 minute!

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Tips To Improve Your Analysis

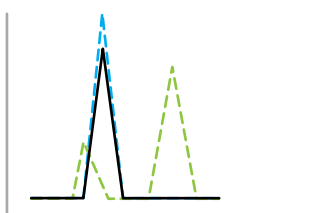
	<p>Fronting Peaks</p> <p>Fronting peaks can occur when the expanded sample exceeds the liner's volume. Reducing your injection volume, increasing split, using a liner with a larger volume, or using a solvent with lower expansion volume can remedy this issue.</p>
	<p>Ghost Peaks</p> <p>Septum bleed or cored septum fragments lodged in the liner can cause ghost peaks. Replacing the inlet liner or quartz wool can help to alleviate this problem. Be sure you are also using the correct septum that is temperature-rated for your analysis.</p>
	<p>Tailing Peaks</p> <p>Contamination or active compounds can cause tailing. Replacing your liner can help to reduce inlet contamination and activity; ensure you are routinely maintaining the inlet for the best performance. If using a liner with wool, try switching to a liner without wool if your sample allows.</p>
	<p>Split Peaks</p> <p>When samples do not vaporize in a single location, split peaks may occur. Try using a liner with wool positioned in the middle of the liner to minimize split peaks.</p>
	<p>Loss of Early Eluting Compounds</p> <p>Early eluting compounds can be lost in cases of high inlet activity or thermal decomposition. Using a single taper liner can help to alleviate this problem. If using wool, try switching to a liner without wool if your sample allows.</p>

Tips To Improve Your Analysis



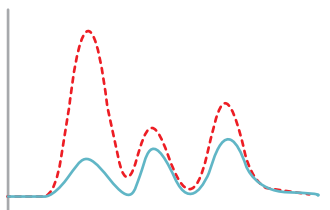
Loss of Late Eluting Compounds

Late eluting compounds can be lost if they have a high molecular weight, which can reduce their volatility and result in inlet discrimination. Using a liner with wool can mitigate this problem.



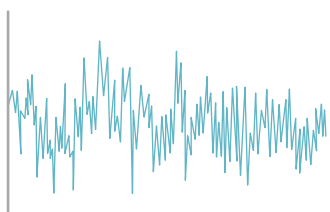
Reproducibility Issues

If your liner contains wool, the wool may shift or become dislodged due to injection or pressure changes, resulting in irreproducible results. Using a Zebron™ PLUS liner with a Z-Liner™ geometry will prevent this shifting and improve reproducibility.



Low Sensitivity / Low Response

If the injector temperature is too low, inlet discrimination may occur resulting in low responses for late eluting and less volatile compounds. Increasing the injection temperature or using an on-column injection with a direct connect liner will help boost sensitivity.



Offset or Noisy Baseline

Contamination in the liner can result in a noisy baseline. Replace your liner regularly to prevent excess baseline noise.



Want More Tips?

Download a FREE copy of the complete GC Troubleshooting Guide online at

www.phenomenex.com/TroubleGC

Frequently Asked Questions

Q1

Why does the inlet require so much troubleshooting?

A

The inlet is the most common place where problems happen in GC. This is because:

- The inlet is subjected to very high temperatures.
- There are multiple consumables involved in the inlet that need routine maintenance.
- Some inlet modes, such as splitless injection, result in a slow process which means that target analytes and the inlet are able to interact with each other for some time before the sample enters the column.

When dealing with active analytes, a highly deactivated inlet is necessary to minimize problems that can occur in the inlet, such as asymmetric peak shape and adsorption of target analytes. Zebtron™ PLUS liners are rigorously deactivated and tested for activity to ensure reliable results when working with highly active compounds.

Q2

How can a Zebtron PLUS liner with wool improve my GC column lifetime?

A

Quartz wool in Zebtron PLUS liners serves two main purposes:

1. Wool promotes homogenous vaporization of analytes and solvent in the inlet, and helps effectively transfer them to the head of the GC column.
 2. Wool acts as a filter, trapping non-volatile impurities and preventing them from proceeding further into the GC column.
-

Q3

Can I pack or re-pack my liner with wool?

A

Liners should not be packed or re-packed. When attempts are made to remove wool from the liner or re-pack them with new wool, scratches in the deactivation layer can be created. When wool is forcefully inserted or removed, these scratches can expose active sites, causing peak tailing and poor reproducibility.

Frequently Asked Questions

Q4

My sample is dirty and it produces a residue on my liner after 100 injections. Can I scrub/sonicate my liner and reuse it?

A

No. It is not recommended to scrub/sonicate your liners. Residue formation indicates contamination. More specifically, this indicates that the sample contains non-volatile impurities. In such cases, it is recommended to replace, rather than clean, your liner. Sonication in solvent can alter the liner's deactivation and scrubbing can create scratches and active sites. Both will result in chromatographic problems including and not limited to poor quantitation, analyte breakdown, poor reproducibility, and peak asymmetry.

Q5

Does the color of a glass liner represent deactivation?

A

The color of the liner does not determine its inertness. In fact, varying colors can be easily added to liners by using metal salts during manufacturing. The inertness of the liner stems from the deactivation process that the liner undergoes, rather than its color alone.

Q6

How often should I change my Zebron™ PLUS liner?

A

It is important to periodically check and maintain your liner. The frequency at which a liner must be changed can be hard to predict as it is entirely dependent on the sample matrix. In general, if you are performing a headspace injection, only the vapors enter the GC inlet so the liner will remain clean for months. However, with a neat matrix injection, it is necessary to check the liner at least twice a week to make sure that it is free of residues. Once a visible residue is noticed, it is time to change the liner.

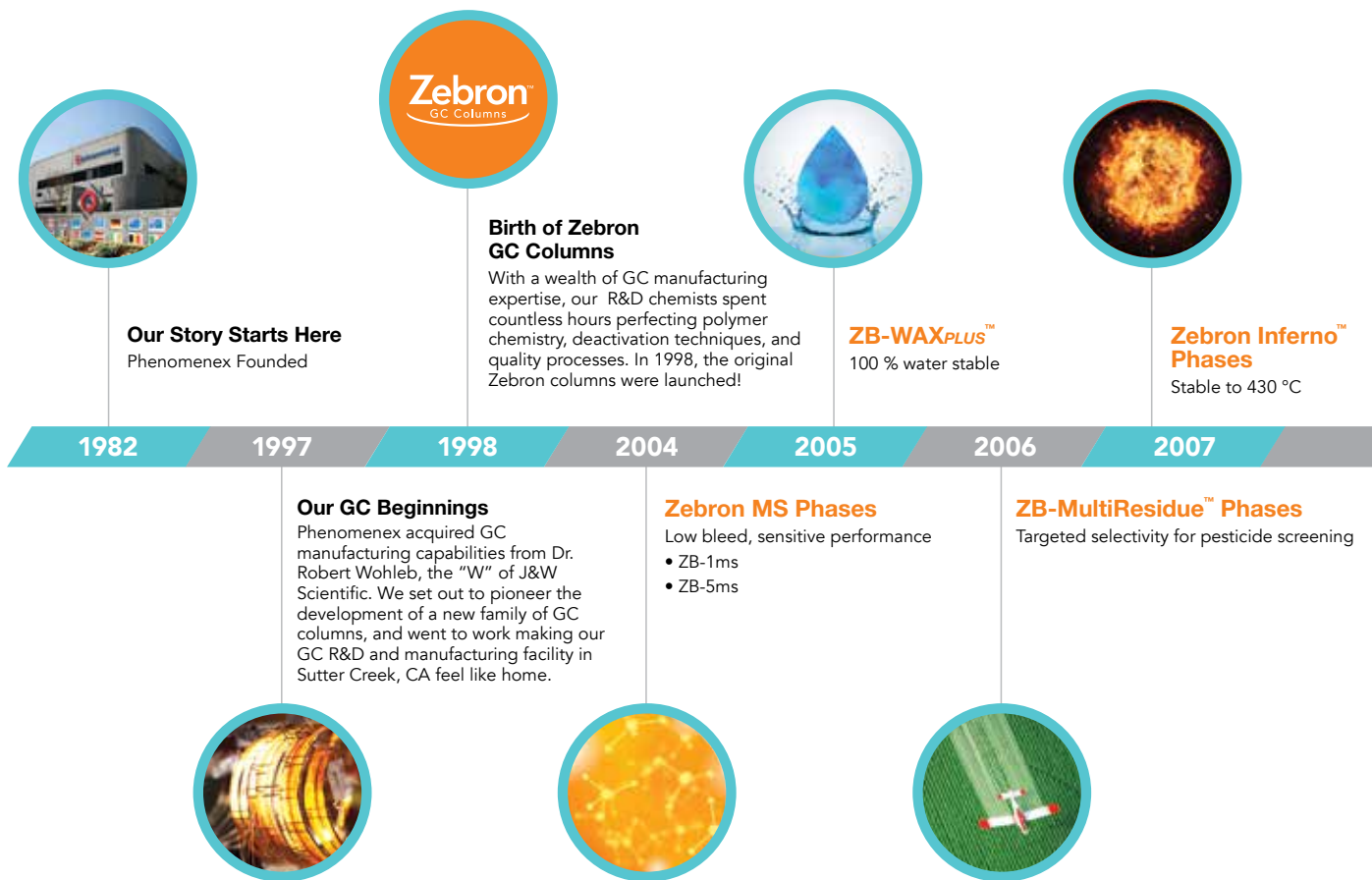
Q7

I am using an inert column for my analysis and I still see peak tailing. What could be the reason for this?

A

For analysis of active compounds, it is extremely important to use both a highly inert column and a highly inert liner. The liner is the first place of potential analyte interaction during GC analysis, and it is important that your analytes are not adsorbed. Zebron PLUS liners undergo a rigorous deactivation process and are tested for inertness to ensure reliable results when working with highly active compounds such as underivatized acids and active bases.

Three Decades of GC Expertise



Try the NEW GC Column Finder!

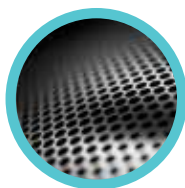
Easily select a column by part number, manufacturer, industry, application or official method in under 1 minute.

www.phenomenex.com/FindGC



Septa

Durable, long lasting septa with GuideRight™ holes for less bent needles
See pp. 6-7



ZB-1XT SimDist

Robust simulated distillation



ZB-SemiVolatiles

Supreme inertness for environmental SVOCs, PBDEs, and PAHs



ZB-5MSPLUS™

The next generation of inertness for a wide variety of applications

2009

2010

2011

2012

2014

2015

2016

ZB-Drug-1

For drugs of abuse



ZB-Bioethanol

Fast, 5 minute results



Zebtron™ Easy Seals™

Easy, washerless, leak-tight performance
See pp. 6-7

ZB-CLPesticides Phases

Versatility for chlorinated pesticides by GC/ECD



Zebtron PLUS Inlet Liners

Inert, easy install liners for superior sample protection



Remarkably Inert!



www.phenomenex.com/Liners

- Superior sample protection
- Easy to install
- A solution for all of your analyses

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