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TECHNICAL ARTICLE

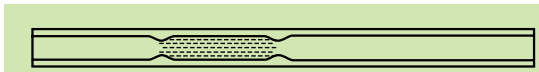
GC Inlet Liners

Which one should I choose?

Q A *How do I choose which liner to use for my analysis?*

There are dozens of different designs for liners. The decision of which one to use is easy.

For Split Injection



Quartz wool in liner:

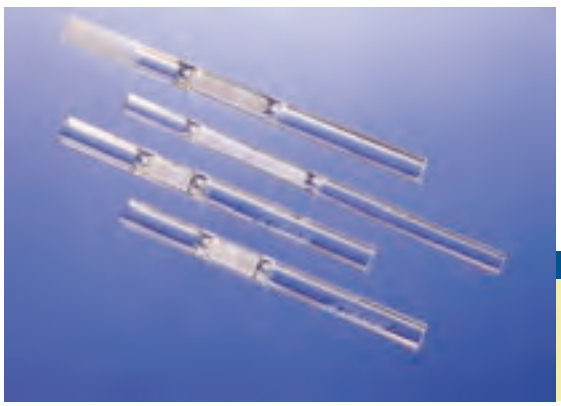
- Promotes mixing of analytes and results in better quantitation
- Provides a large surface area which aids the vaporization of liquid samples
- Acts as a trap to collect non-volatile residue in the sample
- Protects capillary column from 'dirty' samples
- Prevents sample hitting the bottom of the injector before volatilization

Quartz wool in the liner located at the optimum position (FocusLiner™)

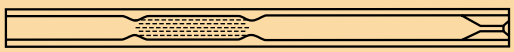
- Excellent reproducibility results from wiping of the sample from the syringe needle and preventing droplet formation.
- Results in lower mass discrimination
- Quartz wool prevents the sample hitting the bottom of the injector

Double glass baffling (FocusLiner™)

- Ensures quartz wool remains in the correct position in the liner
- Top baffle prevents quartz wool shifting towards septum
- Bottom baffle prevents quartz wool being pushed down into the liner



For Splitless Injection



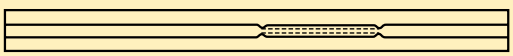
Taper at the bottom of liner

- The taper minimizes contact of analytes with the bottom of the injection port. This is especially important in splitless injection mode because the residence time of the sample in the liner is longer.
- Column installation into the liner becomes more robust because the taper 'channels' the analytes into the column. The distance the column is inserted into the liner is not so critical.

For Splitless Injection – Very Active Compounds

- The taper minimizes contact of analytes with the bottom of the injection port. This is especially important in splitless injection mode because the residence time of the sample in the liner is longer.
- No quartz wool.

For Fast GC Column Analysis



Narrow internal diameter

- Results in smaller peak widths.
- Especially suited for (100µm) Fast columns.

Deactivation

The surface of borosilicate glass is naturally acidic and can contain free silanols, hydrated silanols or

LINER Tip

DO NOT use chromic acid to clean your liner. This reagent will leave metal contamination on the surface of your liner, increasing liner activity.

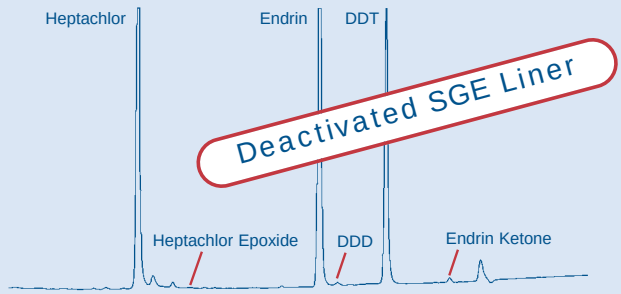
siloxane bridges. Deactivation involves the chemical introduction of a non-polar group to make the surface more inert.

All SGE liners are deactivated using a proprietary HIGH TEMPERATURE gas phase deactivation.

How often should I change my Liner?

The short answer to this is when either quantitation or peak shape deteriorates. Some laboratories injecting very dirty samples will change their liners daily. Other laboratories injecting cleaner samples will only need to change their liner once a month. We recommend a change frequency of at least once a month, preferably once a week.

Figure 1. Chemical Inertness 5pg/Component Level



The above chromatogram illustrates the efficiency of the SGE high temperature deactivation process, effectively NO degradation of the probe compounds (Heptachlor Epoxide, DDD, Endrin Ketone).are observed.

Features and Benefits of SGE's Deactivation Process

FEATURE	BENEFIT
Gas phase deactivation.	More complete coverage of liner and quartz wool surface.
High temperature (400°C) deactivation.	Deactivation won't be stripped when using very hot injectors.
In-situ deactivation.	No manual handling of quartz wool after deactivation, resulting in better stability of deactivation.

Liner Volume and Flashback

Not all solvents will expand to the same volume under a set of conditions. It is important to remember that the gas volume will increase as the molecular weight decreases. Flashback occurs when the volume of the liner is not sufficient to handle the expanded gas volume.

This is one of the reasons why water is a very difficult solvent. Water will expand up to four times the volume compared with methylene chloride. For example, a straight-through liner with an inner diameter of 4 mm and a length of 78.5 mm will have an internal volume of approximately 1.0ml. A 1.0µL injection of methylene chloride at 250°C and an inlet pressure of 10 psi will expand to 0.39mL. Clearly this is OK if the total volume of the liner is 1.0mL. However, for a 1.0mL injection of water, the gas expansion volume will be 1.41mL which is obviously greater than the volume of the liner. If this quantity of water is injected under these conditions, the vapor will expand beyond the liner and end up in the purge lines and the carrier gas inlet lines. Eventually, the vapor will work its way back into the inlet and the column. This effect is known as **Flashback.**

The result of flashback is that solvent and sample can flow back into the inlet and purge gas lines causing contamination of your system. A really bad case can result in the need to replace the plumbing and gas lines.

FLASHBACK can cause severe problems:

- **Erratic quantitation**
- **Ongoing system contamination**
- **Ghost peaks**
- **Peak tailing**

The effect of flashback is much more prevalent in splitless injection systems.

There are a number of ways to prevent flashback. The first point is to be aware that it can happen. By understanding the expansion volume of a liquid to a gas and knowing the volume of the injector, flashback can be avoided.

For further information on our range of GC Inlet Liners please request our "Inlet Supplies" brochure from your nearest SGE office or distributor.