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TECHNICAL ARTICLE

FocusLiner™ (Pat. Pending)

Improve GC accuracy and reproducibility 10 Fold

For most chromatographers poor sample reproducibility is generally observed from one consecutive injection to another. This generally indicates that small variations in the volume of sample injected have occurred and would be overcome if an autosampler was used. Alternatively poor reproducibility can be caused by chromatographic activity of the column or the degradation of the compounds by the glass inlet liner.

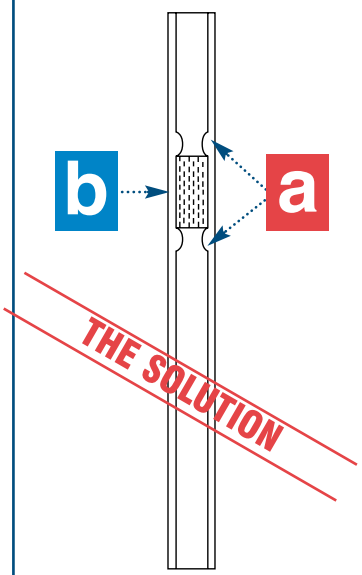
In fact, the major contributor to poor reproducibility in split analyses is the position of the quartz wool in the injection liner. The quartz wool is normally present in the injection port liner to trap sample and to homogenize the vapour prior to splitting and entering to the column. However, what is more important is its location in relation to the needle tip of the syringe during injection. At the point of injection the needle tip must penetrate the quartz wool to maximise vaporisation of the sample and to wipe any droplets that form on the needle tip, before removal from the injector.

Unfortunately, there is no guarantee that once the liner is installed in the injector, that the quartz wool plug will stay in the correct position.

SGE FocusLiner™

SGE now makes available the FocusLiner™, a liner design which overcomes this problem. Using a simple but effective design, the quartz wool is held in the correct position by means of two tapered sections in the liner **(figure 1).** The tapered sections are located to ensure the needle tip penetrates the secured quartz wool plug wiping any residue liquid sample from the needle tip while providing sufficient surface area for volatilisation of the liquid sample.

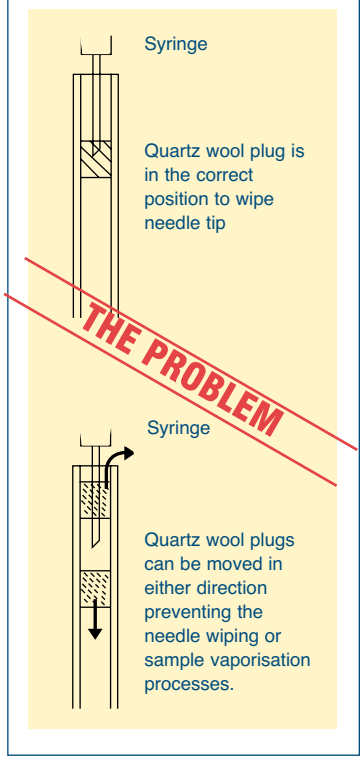
Figure 1.
SGE FocusLiner™



Two tapered section (a) secures the quartz wool plug (b) in the correct position to ensure improved reproducibility

Current liner designs which utilise quartz wool to improve vaporisation are frequently positioned incorrectly. Compounding the problem, the unsecured quartz wool plug can be easily dislodged without the chromatographer's knowledge **(figure 2)**. Displacement of the quartz wool can be caused by repeated injections. Each insertion of the needle tip can progressively move the plug until no further contact is made. Dislodging the plug can also occur through a sudden change in inlet pressure. For instance, removing the column from the injector or changing the septum can cause a sudden pressure change in the injector resulting in the movement of the plug.

Figure 2. Dislocation of quartz wool



Relocation of the quartz wool plug from the correct position can also be characterised by excessive tailing of the solvent peak **(figure 4A).** Only when the plug is correctly positioned to wipe the needle tip can sharp solvent peaks as in **figure 4B** be acheived.

Figure 3 illustrates the effects on sample precision (%RSD) from the location of the quartz wool plug in the liner. Another frequently used split liner was also evaluated. This liner design substitutes the quartz wool with a sintered glass frit which can be fixed or removable. In this experiment a 4mm ID fixed frit liner design was used.

When the quartz wool plug is moved to the centre of the liner (as often supplied by other manufacturers), %RSD values are up to 20 TIMES higher than those measured for the FocusLiner.

The fixed sintered glass frit liner is also unable to match the precision provided by the FocusLiner. This result is not surprising as the key element in achieving good sample reproducibility is the needle tip wiping process during injection. Therefore, liners with fixed or removable frits can only ever be used with limited success.

Sample accuracy is also a critical factor in providing confidence in sample quantitation. Peak areas for the probe compounds using the FocusLiner were found to be, on average, 25% higher than a liner where the quartz wool is positioned incorrectly. Solvent peak tailing is also observed **(Figure 4A & B)** if the wool is incorrectly positioned due to slow vapourization near the cool septum cap as the needle is wiped during withdrawal.

Only the FocusLiner provides the levels of reproduciblity and confidence that is needed for split injection analyses.

Figure 4A. Liner centrally packed

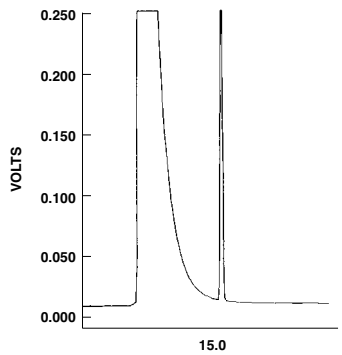


Figure 4B. Liner packed to wipe needle

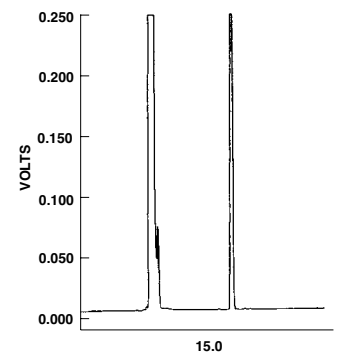
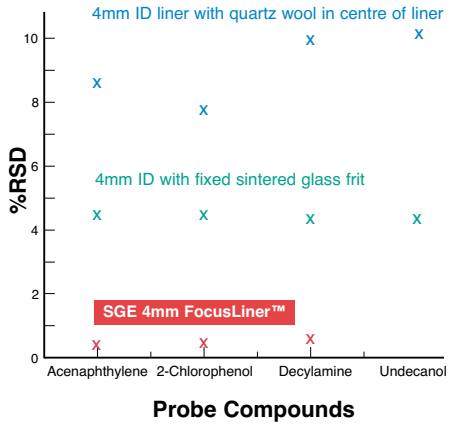


Figure 3. %RSD values for probe compounds using different quartz wool positions



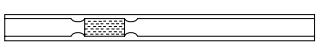
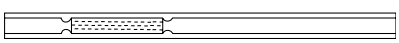
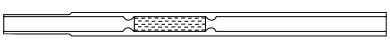
A Complete Liner Deactivation Process

Chemical inertness of the inlet liner is as critical as its design if accurate and reproducible transfer of a sample from the syringe to the column is to occur. The analysis of reactive compounds, like those in the environmental and pharmaceuticals areas, are often limited by the chemical inertness and thermal stability of inlet liners. Complete loss of these types of compounds in the injector are quite common and can occur even after only a few injections.

What is required is a deactivation process which can deliver the level of inertness and thermal stability expected for a high performance capillary column. SGE has utilised the same technology used in the preparation of the BPX range of columns and adapted it to the deactivation of inlet liners. This process is performed at very high temperatures under well controlled conditions to produce a silanized surface treatment which exhibits both excellent thermal and chemical stability.

Only when both of these properties are achieved can the maximum operating life of an inlet liner be realised.

FOCUSLINER™ FOR AUTOSAMPLER GENERAL DEACTIVATION TYPE: HIGH TEMPERATURE

	Liner Description	Liner Dimensions	Pkt size	Part No.
	**Agilent Technologies (HP) 5890/6890** Split/Splitless	4mm ID 78.5 x 6.3mm OD	5 25	**092002** **092219**
	**Shimadzu, model 17A** Split/Splitless	3mm ID 95.5 x 5.0mm OD	5	**092062**
	**Varian, models 1075/1077** Split/Splitless	4mm ID 72 x 6.3mm OD	5	**092022**
	**Perkin Elmer, Autosystem** Split/Splitless	4mm ID 92 x 6.2mm OD	5	**092092**