Eliminate adsorptive effects in sample transfer systems with Sulfinert.

A comparison of the transport properties of Sulfinert® treated electropolished stainless steel tubing, untreated electropolished stainless steel tubing, and raw commercial grade stainless steel tubing show only Sulfinert® treated electropolished stainless steel has the inertness necessary for quantitatively transferring sulfur compounds at low ppmv to low ppbv concentrations in sample streams.

Figure 2 demonstrates how Sulfinert® treatment can eliminate costly analytical test errors caused by sulfur adsorption. Sulfinert® treated electropolished tubing did not adsorb methyl mercaptan to any measurable extent, delivering a representative sample with no delay. The untreated electropolished tubing, in contrast, totally adsorbed methyl mercaptan for more than 75 minutes, and the sulfur gas level did not stabilize until approximately 130 minutes. Conventional 316L seamless tubing totally adsorbed methyl mercaptan for more than 90 minutes, and the sulfur gas level did not stabilize until approximately 140 minutes.

Closely correlated to the adsorption of sulfur compounds by system components is the subsequent release of the adsorbed compounds. When adsorption of sulfur-containing compounds is prolonged, desorption from the surface also is slow. This "memory" of adsorbed active compounds can cause long delays in equilibrating a sample stream. Figure 3 demonstrates the memory effects of the three types of tubing. The Sulfinert® treated tubing shows less retention of sulfur compounds by several orders of magnitude, indicating very high inertness.

David Smith
Restek Performance Coatings Senior Scientist
16+ years of service!

Figure 2 Sulfinert® treated electropolished stainless steel tubing (red) does not adsorb methyl mercaptan (500ppbv).

blue—untreated electropolished tubing, violet—commercial grade tubing.

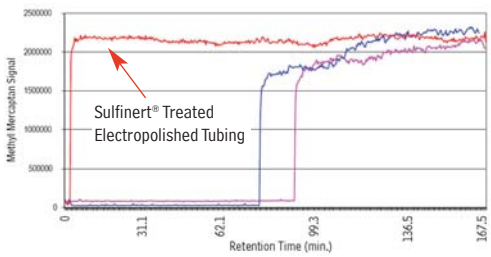
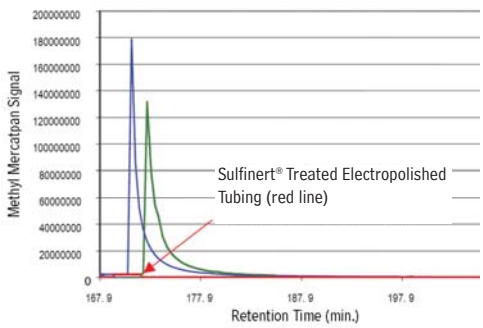


Figure 3 Sulfinert® treatment (red) prevents memory effects compared to untreated electropolished (blue) and raw (green) tubing.



Improve reliability while reducing costs!

Sulfinert® adds value to sampling and transfer systems by improving test accuracy and reducing cycle times. Improved accuracy and reliability of data for sulfur, achieved using Sulfinert® treated transfer and sampling equipment, mean downstream processes can be more precisely controlled, resulting in considerable cost savings. Shorter cycles translate directly into more samples collected and analyzed in a given period of time. Typical savings can be calculated by looking at the average per-hour cost of operating a process that relies on accurate quantification of sulfur compounds.[1] Example monetary values are listed in Table I.

Table I

A 1-hour delay can cost:[1]

800,000 tpy ethylene plant	$50,000
250,000 tpy LDPE unit	$36,000
250,000 tpy EBSM styrene plant	$33,000
200,000 tpy anti-freeze process	$3,600

tpy = tons per year

In Summary

We obtained accurate data, with no delay between samples, by using Sulfinert® treated electropolished tubing in the sampling-storage-transport system. In contrast, we obtained significantly less accurate data, even with delays of more than two hours between samples, by using untreated tubing. Analysts charged with monitoring sulfur levels in process streams can significantly improve profitability by using Sulfinert® treated system components and Sulfinert® treated electropolished tubing transport lines.

thank **you**

Shell Research and Technology Centre, Amsterdam, for data used in evaluating sulfur gas uptake and memory effects of tubing substrates.

Reference

[1] *Application of TrueTube™ in Analytical Measurement* Cardinal UHP (St. Louis, MO) August 2004. Available at www.restekcoatings.com, by contacting us at 800-356-1688, ext. 4, or by contacting your Restek representative. Request lit. cat.# 59088.