

Deactivated Sampling and Transfer System Components

SilcoNert™2000 formerly Siltek® & Sulfinert®

SilcoTek™ surface treatments enable quantitative delivery of active compounds.

Maximize the performance of your products

SilcoNert.2000

The ultimate passivation for
Stainless steel, glass, steel, and
high nickel alloys of steel.

SilcoNert.2000

A required treatment for metal
components when analyzing for
parts-per-billion levels of
organo-sulfur compounds.

SilcoNert™2000 surface treatment eliminates surface adsorption of active compounds on steel, glass, ceramic and carbon surfaces.

Sulfur Compound Storage in SilcoNert™2000 Treated vs. Untreated Sample Cylinders

Figure 1 depicts performance results from a comparison in which a gas containing 17ppbv of hydrogen sulfide was stored for 7 days in untreated and in SilcoNert™2000 treated stainless steel high pressure sample cylinders. The results show a SilcoNert™2000 treated sampling system will reliably store low levels of this active sulfur-containing compound in process streams for long periods of time. In contrast, hydrogen sulfide degraded rapidly in the untreated cylinder, and was totally adsorbed within 24 hours.

Figure 1 Sulfur compounds are stable in SilcoNert™2000 treated stainless steel systems - 17ppbv hydrogen sulfide in 500mL cylinders¹
Data courtesy of Restek Corp.

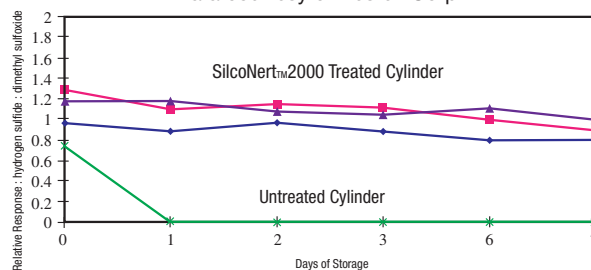
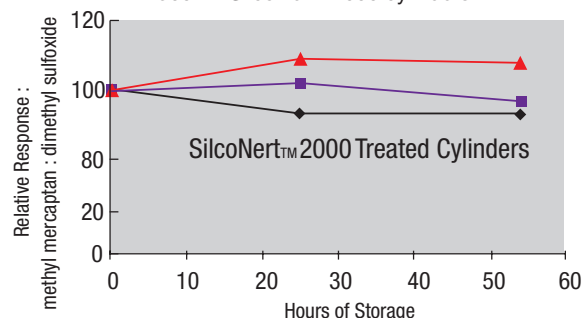


Figure 2 summarizes the results of a similar study in which gas containing 18.8 ppbv methyl mercaptan was stored for 60 hours in SilcoNert™2000 treated sample cylinders. Again, recovery of the active sulfur gas was accurate at the low ppbv concentration, confirming that the sample was stored in contact with an inert surface.

Figure 2 18.8ppbv methyl mercaptan is stable for over 60 hours in 300mL SilcoNert™2000 cylinders¹



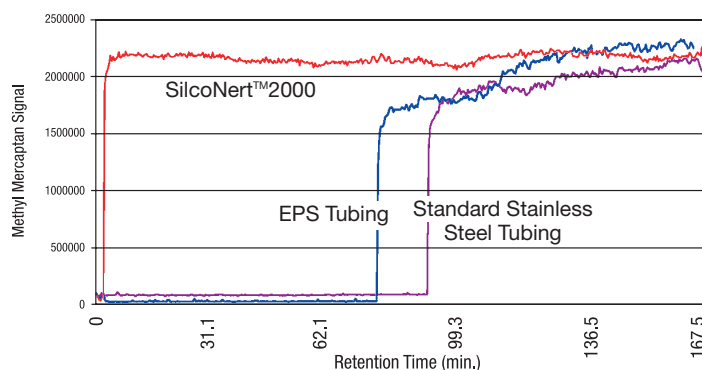
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Adsorption of Sulfur Compounds to Tubing Surfaces under sample transfer conditions

Comparison of the transport properties of SilcoNert™2000 treated electropolished stainless steel tubing, and raw commercial grade stainless steel tubing show only SilcoNert™2000 treated electropolished stainless steel has the inertness necessary to transfer sulfur compounds at low ppmv to low ppbv concentrations in sample streams.

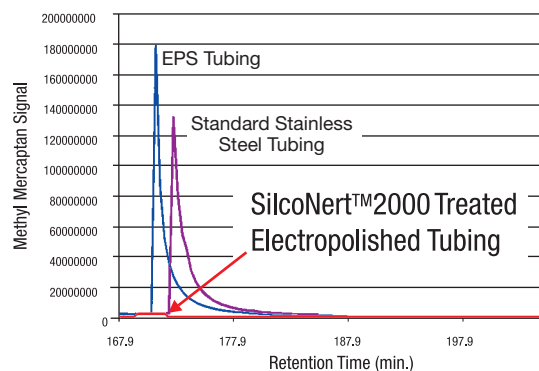
Figure 3 demonstrates uptake of the sulfur compound by the three surfaces. The performance of the SilcoNert™2000 treated, electropolished surface is quite dramatic in comparison to that of untreated electropolished tubing. SilcoNert™2000 treated electropolished tubing did not adsorb methyl mercaptan 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.

Figure 3 SilcoNert™2000 treated electropolished stainless steel tubing (red) does not adsorb methyl mercaptan (500ppbv) compared to untreated seamless stainless steel tubing (blue and violet). Data courtesy of Shell Corp. and O'Brien Corp.



The “memory” of adsorbed active compounds can cause long delays in equilibrating a sample stream. Figure 4 demonstrates the memory effects of the three types of tubing used to transfer streams containing sulfur compounds. The SilcoNert™2000 treated tubing shows less retention of sulfur compounds by several orders of magnitude, indicating very high inertness.

Figure 4 Sulfur memory is prolonged in raw commercial grade stainless steel tubing. SilcoNert™2000 treated electropolished tubing; shows no memory effects (500ppbv methyl mercaptan in helium). Data courtesy of Shell Corp. and O'Brien Corp.



Value of an Inert Pathway

SilcoNert™2000 treated sampling and transfer equipment results in more accurate sampling and faster cycle times. Improved accuracy and reliability of data for sulfur, achieved using SilcoNert™2000 treated transfer and sampling equipment, mean downstream processes can be more precisely controlled, resulting in significant 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) For example, a 1 hour delay can cost: 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

In Summary Our treatments maximize the performance of your product the first time, every time while saving you thousands in improved yields, better test cycle times and improved system reliability! To learn more visit our web site at www.SilcoTek.com or call us at 814-353-1778.

Reference 1. D. Smith, D. Shelow, G. Barone; “Instrument and Sampling Equipment Passivation Requirements to Meet Current Demands for Low-Level Sulfur Analysis”; Presented at Gulf Coast Conference, 2001; Restek Corporation, Bellefonte, PA 16823.

2. Application of TrueTube™ in Analytical Measurement Cardinal UHP August 2004. The authors thank the staff at Shell Research and Technology Centre, Amsterdam, for data used in evaluating sulfur gas uptake and memory effects of tubing substrates.

