



## Chemical/Petrochemical

# Stable Sulfur & Mercury Sampling in Refineries

## Using Siltek® and Sulfinert® Surface Treated Components

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- Reliably sample sulfur and mercury compounds at ppb levels.
- Reduce lab costs—obtain accurate results the first time.
- Detect costly process upsets, improving product yield.

Refinery and natural gas samples often contain trace amounts of sulfur- and mercury-containing compounds, which can interfere with reactions, poison catalysts in petrochemical processes, and damage equipment. Because these compounds quickly react with stainless steel surfaces, accurate determination of these compounds is impossible when samples are collected and stored in untreated sample cylinders. Restek's Siltek® and Sulfinert® passivation techniques bond an inert layer into the surface of stainless steel, preventing active compounds from reacting with or adsorbing to the steel.

### Accurate Sulfur Sampling

To characterize Sulfinert® surfaces, we tested the stability of 17ppbv standards of sulfur compounds in three Sulfinert® sample cylinders over a 54-hour period. Dimethyl sulfide, which is not adsorbed by stainless steel, was used as an internal standard. The Sulfinert®-treated cylinders were inert to the reactive sulfur compounds over the 54-hour test period (Figure 1). Hydrogen sulfide exhibited greater than 85% recovery; methyl mercaptan, ethyl mercaptan, carbonyl sulfide, and dimethyl disulfide exhibited greater than 90% recovery.

Sulfinert®-treated gas sampling equipment is ideal for collecting and storing samples containing ppb levels of sulfur compounds, such as natural gas or beverage-grade carbon dioxide. Sulfinert® treatment ensures that sulfur compounds or other



highly active compounds remain stable during transport from the field to the laboratory.

## Stable Mercury Results

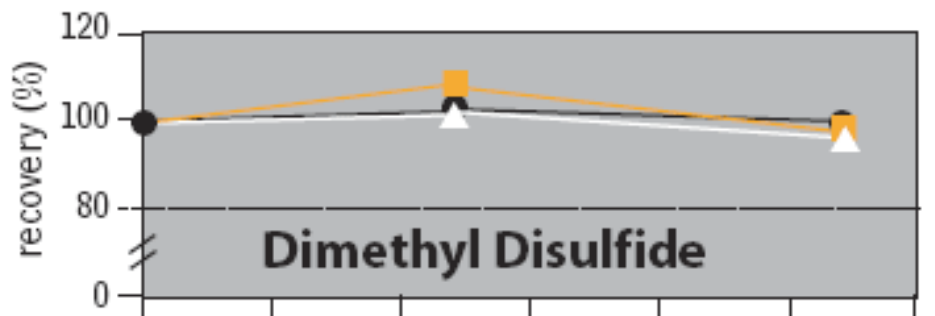
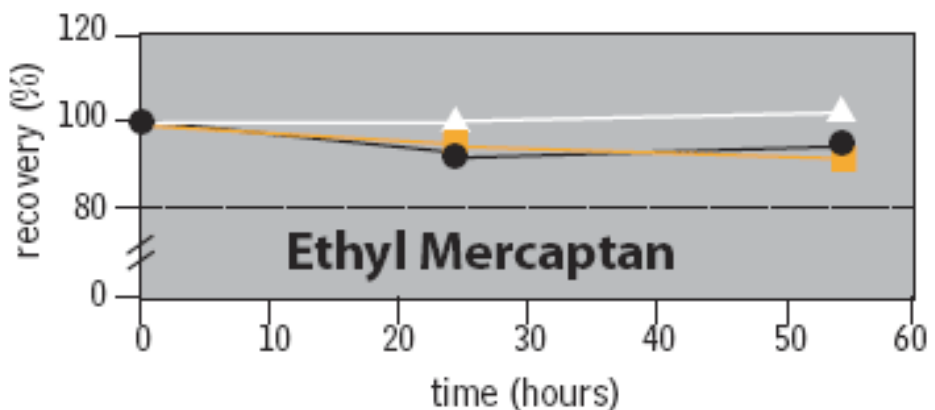
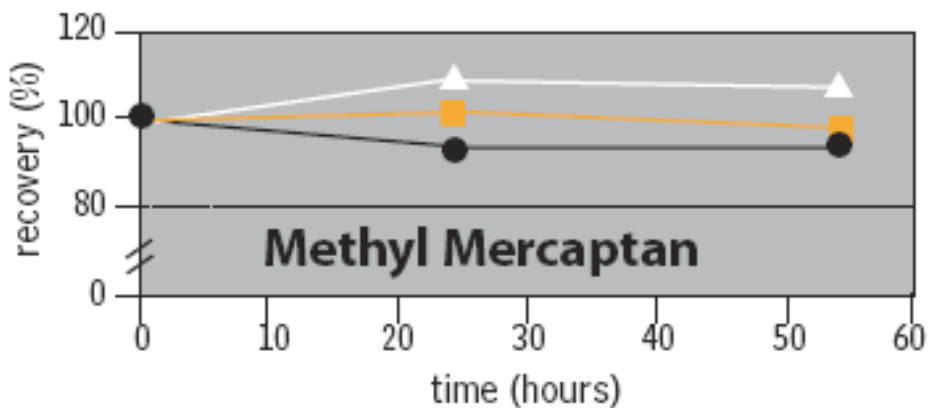
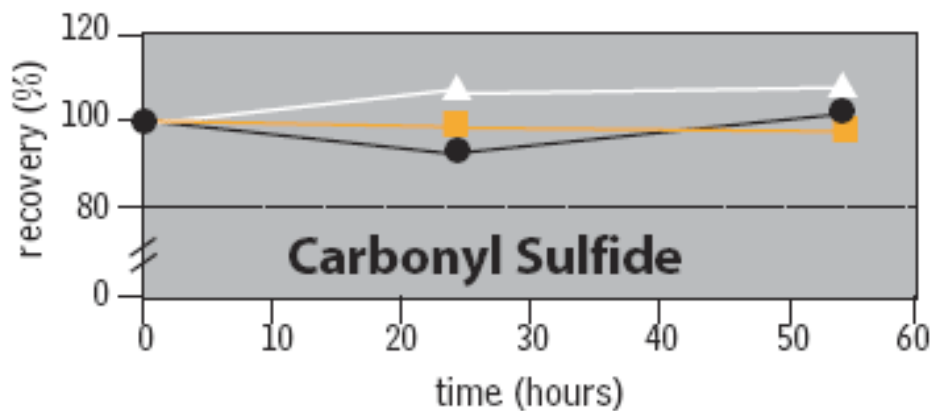
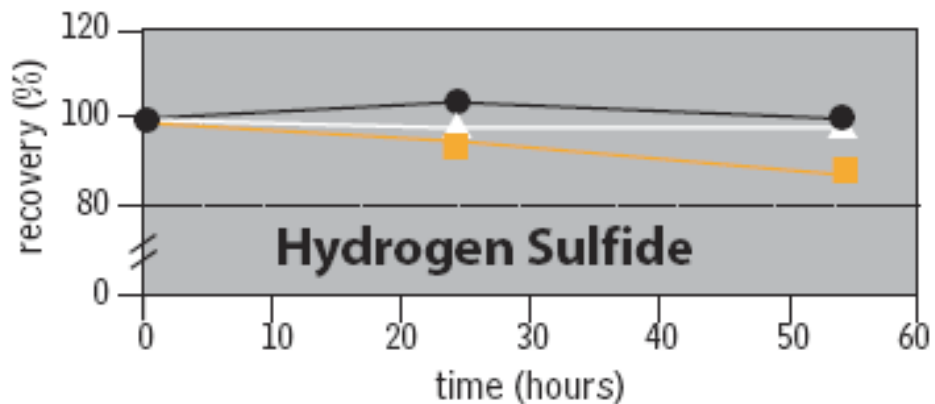
Siltek® surface treatment has been used in a wide variety of applications in which an inert surface is of paramount importance. To measure the impact of Siltek® treatment on adsorption of mercury during storage, we compared the performances of 304 grade stainless steel gas sampling cylinders (Swagelok®, Solon OH) with and without Siltek® treatment.

We filled each cylinder with 8µg/m<sup>3</sup> of elemental mercury (approximately 1 part per billion) (Spectra Gases, Alpha NJ) and assessed the mercury concentration in each cylinder over time to determine changes in mercury concentration. Detection was achieved by direct interface gas sampling to an atomic adsorption detector. Sample pathway regulator and tubing were Siltek® treated to ensure accurate transfer.

The data in Figure 2 demonstrate that Siltek® treatment provides a stable surface for elemental mercury, and untreated stainless steel does not. Based on these results, we conclude that Siltek® surface treatment for steel or stainless steel components and tubing in CMMS and sorbent tube mercury sampling systems will improve analytical reliability.

Siltek® and Sulfinert® surface treated cylinders and sampling components provide an inert sample path, which prevents adsorption of active compounds and ensures accurate sampling. For more information about these treatments, visit us at [www.restekcoatings.com](http://www.restekcoatings.com).

Figure 1: Stability of sulfur compounds is remarkable in Sulfinert®-treated cylinders.



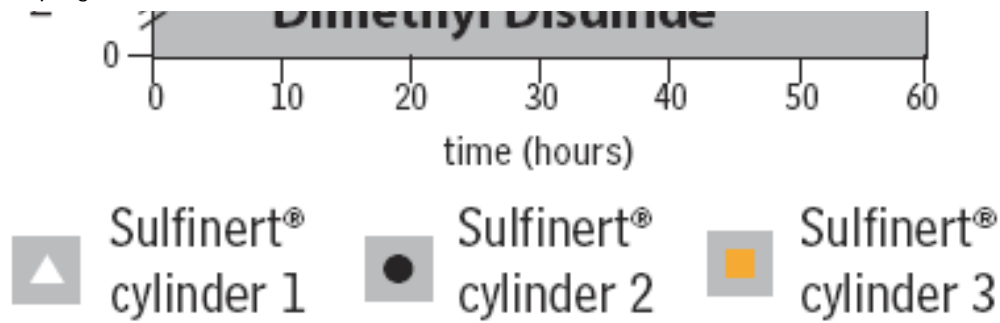
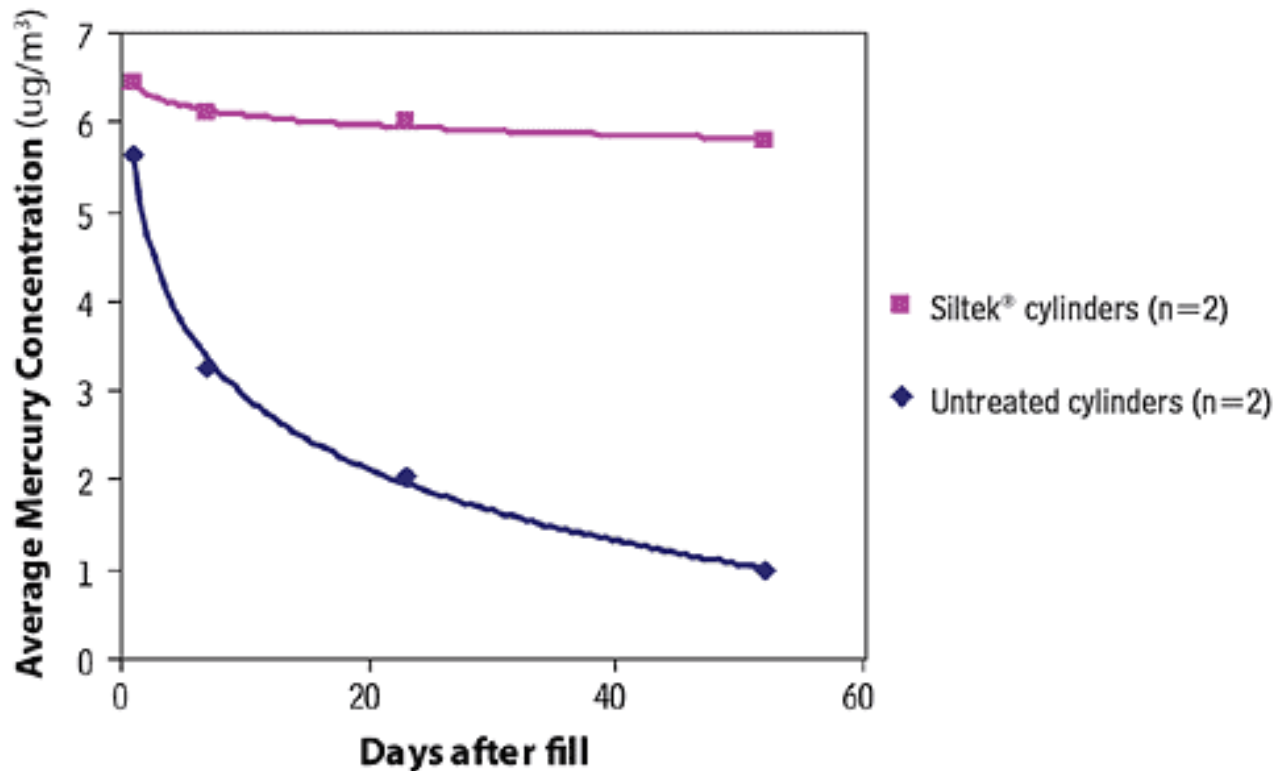


Figure 2: Siltek® treated gas sampling cylinders show very good inertness toward mercury.



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## RESTEK PRODUCTS

Restek Performance Coatings Products

