# Sulfur and Mercury Sampling in Refineries Using SilcoNert®2000

SilcoNert 2000 is inert to sulfur and mercury compounds to part per billion (PPB) levels.

Refinery and natural gas samples often contain trace amounts of sulfur-containing compounds like hydrogen sulfide (H2S) and mercury-containing compounds. Sulfur, hydrogen sulfide and mercury compounds can interfere with reactions, poison catalysts in petrochemical processes, and damage equipment.

Because sulfur and mercury compounds quickly react with stainless steel surfaces, accurate determination of these compounds is impossible when samples are collected and stored in untreated sample cylinders. (see figure 1)

Figure 1 shows complete loss of Sulfur compounds in as little as 1 day[1] with uncoated cylinders while SilcoNert 2000 treated cylinders maintain sulfur stability for 7 days, or longer.
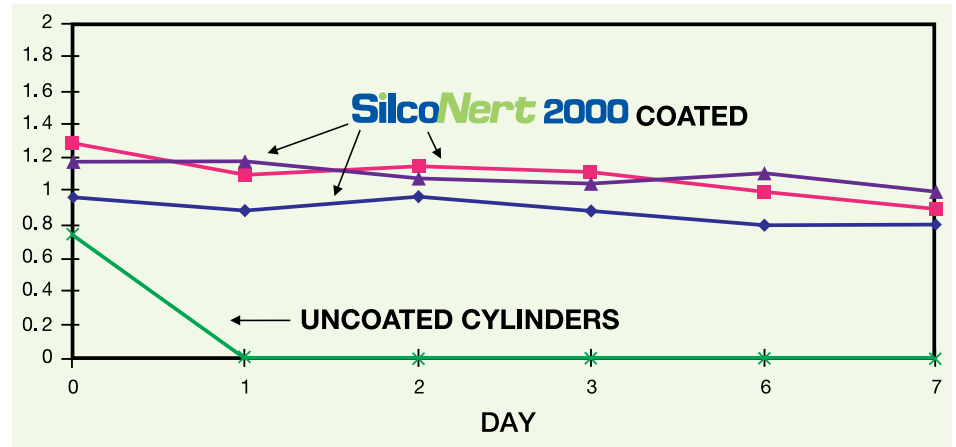

- Reliable sulfur and mercury sampling to ppb levels

- Accurate sampling the first time, every time

- Reduce lab costs

- Accurately grade feedstock

- Detect costly process upsets

- Improve product yield

SilcoTek's innovative coating, SilcoNert 2000, bonds an inert silicon layer into the surface of stainless steel, preventing active compounds, like sulfur or mercury, from reacting with or adsorbing to the steel. The high temperature, durable coating will conform to most intricate surfaces while maintaining high dimensional tolerances. SilcoNert 2000 will deform with tubing surfaces allowing for radius bends and will not interfere with threaded or compression joints; making SilcoNert 2000 the ideal coating for refinery gas sampling, flare gas sampling, and process sampling.
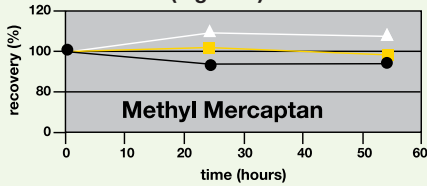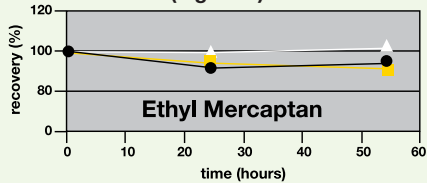
Hydrogen sulfide (H2S) exhibited greater than 85% recovery [2.]
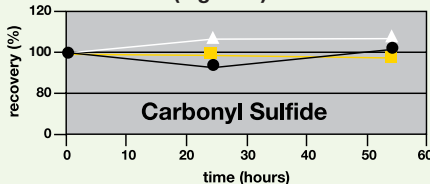**(Figure 2).**
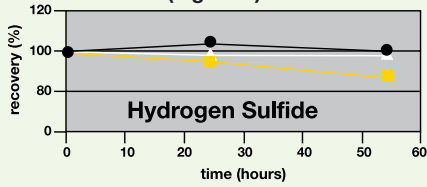
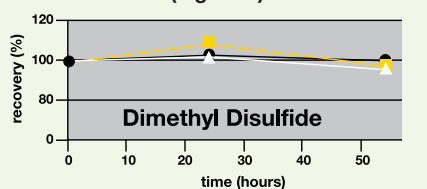## Methyl mercaptan exhibited greater than 90% recovery
(Figure 3)

Ethyl mercaptan demonstrated greater than 90% recovery
(Figure 4)

Carbonyl sulfide, greater than 90% recovery
(Figure 5)

And dimethyl disulfide exhibited greater than 90% recovery
(Figure 6)

△ SilcoNert 2000 cylinder 1
● SilcoNert 2000 cylinder 2
■ SilcoNert 2000 cylinder 3

SilcoNert 2000 treated gas sampling equipment is ideal for collecting and storing samples containing ppb levels of sulfur compounds, such as those found in natural gas or beverage-grade carbon dioxide. SilcoNert 2000 treatment ensures that sulfur compounds, like hydrogen sulfide (H2S) or other highly active compounds remain stable during transport from the field to the laboratory, resulting in accurate, reliable sampling the first time, every time.

Figures 2 through 6 show significant stability of the SilcoNert 2000 surface when exposed to common sulfur containing compounds like hydrogen sulfide (H2S), mercaptans, and other sulfur containing species. Typical sulfur compound recovery rates exceeded 90%, even when sampling low ppb concentrations.[2.]

Stable Mercury Results

SilcoNert 2000 is utilized in a wide variety of mercury sample containment and transport applications such as stack and flare gas sampling, CMMS sampling, down-hole sampling, and natural gas pipeline sampling.

A typical sampling train schematic (below)[3]; application of SlicoNert2000 to all components of a stack or continuous emission monitoring system will greatly improve analytical reliability.
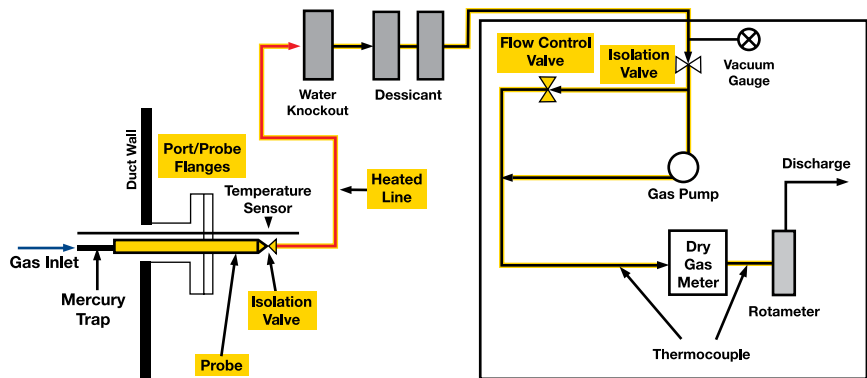
Summary

SilcoNert 2000 treated sampling and transfer systems allow refineries to obtain accurate sulfur and mercury data the first time, every time with no delay, sample errors, or false readings down to ppb levels. Analysts charged with monitoring sulfur and mercury levels in process streams can save 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.

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References

1. Barone, G., Higgins, M., Smith, D.; Restek Corp.; Rowan, S., Gross, W.J.; O'Brien Corp.; Harris, P., "The Surface for Sulfurs" Hydrocarbon Engineering, Dec. 2004 (pg. 47-50)

2. Barone, G., DeGraff, ., Restek Corp., "Stable Sulfur Mercury Sampling in Refineries," Restek Advantage, 2008, Vol. 1

3. Proposed Method 324. Determination of Vapor Phase Flue Gas Mercury Emissions from Stationary Sources Using Dry Sorbent Trap Sampling. United States EPA. Washington, D.C P.5.