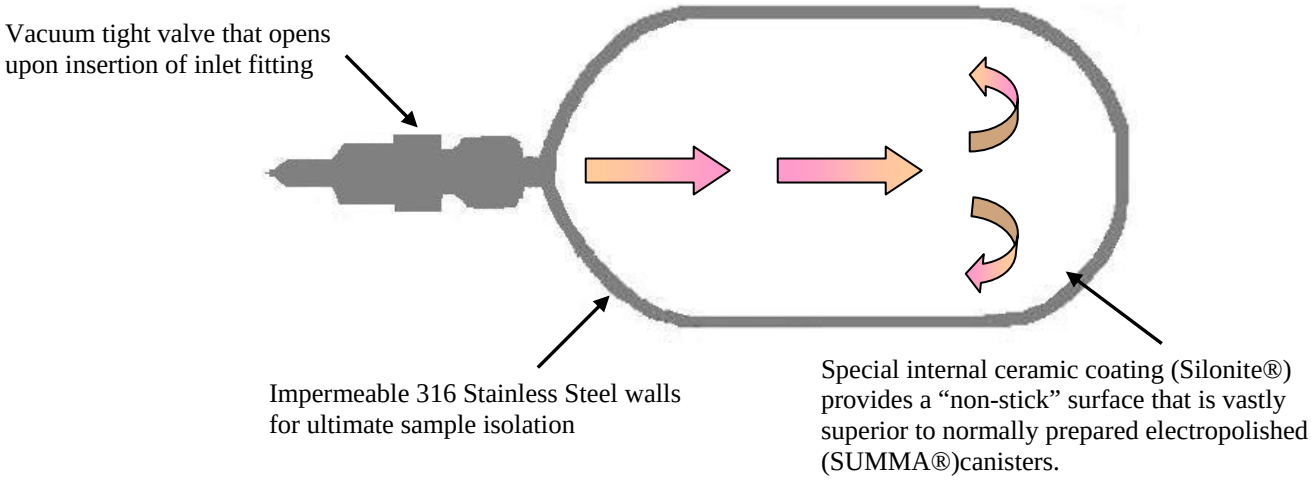
Whole Air Canisters
Introduction

ESIS Environmental Health Laboratory

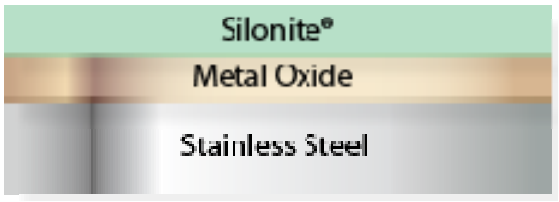
THE CANISTER

Silonite® coated whole air canisters provide a quick sampling approach to industrial environments while eliminating the need for sampling pumps, rotameters, electrical power (AC or batteries), attendance during sampling or special storage of collected samples. The vacuum in the whole air sampler is used to draw in the sample and is designed to seal the canister upon completion of sample collection. This considerably simplifies the sampling process relative to sorbent tubes or Tedlar bags. An excellent choice when more than one media type is required during a survey.



Silonite® is a fused silica coating, developed by Entech Instruments Inc., to provide an extremely inert surface treatment for chromatography applications. The coating process creates an ultra-smooth surface which reduces the potential for chemical adsorption. The high density of fused silica (2.33 g/cc) nearly eliminates the absorption effects prevalent in plastics (Teflon®, Tedlar® or Siloxane treated surfaces).

Stainless steel and glass are the most commonly used materials in GC inlet and sample handling systems. However, surface imperfections even exist with high quality 316L stainless steel, causing substantial adsorption of vapor phase chemicals. At elevated temperatures, surface metal oxides can be catalytic, especially exposed iron on the surface or in pores below the surface. Although similar to fused silica, glass also contains additives which have a negative effect on surface inertness. These include iron, sodium and boron. Placing a thin layer of fused silica over these surfaces eliminates the exposure of the sample to reactive additives and impurities.



If fused silica is colorless, why are Silonite® coated parts so colorful? Placing a smooth, transparent coating over stainless steel surfaces results in a phenomenon known as "thin film interference" where light reflecting off the fused silica layer becomes out of phase with light reflecting off the stainless steel surface below. The cancellation of part of the light spectrum and enhancement of other wavelengths turns normal white light into one of several different shades exhibited by Silonite® coated parts. The actual color formed is an indication of the thickness of the coating. As the thickness increases from 150 to 1000 angstroms, the apparent color of Silonite® coating goes through the following color progression:

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SAMPLE COLLECTION

Whole air sampling does not attempt to "extract" chemicals at the time of sampling, and is therefore inherently more reproducible than badge, cartridge, and tube sampling. Whether performing Ceiling, STEL, or Time Weighted Average sampling, detection limits are always the same because the sampling rate is adjusted to always provide a near atmospheric pressure sample. Interaction of the target compounds with the matrix is substantially reduced by leaving the sample analytes in the gas phase, virtually eliminating any matrix effect on target compound measurements. ESIS EHL uses Silonite® coated materials in the entire sample flow path, ensuring the highest sample integrity and reproducibility, regardless of the analytical test.

Silonite coated regulator

Whole air canisters are universal, recovering all amenable analytes in a single sampling event. The fill rate is adjusted to change the integration time of the sample. The sample collected is enough to provide multiple analyses in the laboratory, with detection limits down to low PPT, if needed. This universal sampling system can provide quantitative and qualitative data for polar, non-polar, sulfur, oxygenated and reactive volatile organics. Detection range extends from 0.5 ppb to the percent range – ideal for indoor air, soil gas or source level sampling. Regardless of the concentration or compound of interest, the whole air sampling canister can complete a sampling event in as little as 2 seconds (ceiling measurements). Using a wide range of sample flow restrictors and regulators, STEL exposure assessment can be extended to monitor events as long as 25 minutes while unattended monitoring events can be as long as 24 hours. No matter how long your sampling event, ESIS EHL can calibrate a flow regulator to meet your needs.

Silonite coated restrictor

Ceiling measurements have historically been a challenge because there is no way to quickly and reproducibly collect a sample using tube and badge samplers. Canisters make this easy. Simply opening and closing the evacuated container accomplishes the task in just a few seconds. The whole air samplers can easily be checked (pre and post sample collection) to show they are still under vacuum, assuring a defensible data collection process.

SAMPLE ANALYSIS

The sample volume is measured at the time of analysis, under laboratory controlled conditions, eliminating the possibility of pump flow variations and calculation errors. Sample holding times are up to several weeks due to the dense, inert Silonite® coating used to line the inside of the canisters and all surfaces that may come in contact with the sample. ESIS EHL uses Silonite® coated materials in the entire sample flow path, ensuring the highest sample integrity and reproducibility, regardless of the analytical test. Unlike thermal desorption tubes, whole air canisters have the capacity to rerun samples if a dilution is required or additional analysis is needed to confirm results.

All analyses are performed by Gas Chromatography/Mass Spectrometry (GC/MS) and include total hydrocarbons quantitated as toluene plus the five largest peaks in the chromatogram as identified by the GC/MS library search software. This allows you to simultaneously quantify a total VOC's concentration and to identify other volatile organics that might be causing an unknown odor.

ESIS EHL also has the ability to calibrate and quantitated most any chemical amenable to canister analysis, not just the stated chemical lists from these specific methods. This will provide you the most comprehensive and reliable sampling data available when special chemicals are of concern.

To collect your samples simply request the specially conditioned whole air canisters from our lab, precalibrated for your specific sampling event. There are no rental charges associated with these canisters or the flow controllers for the first week of use. Please contact ESIS EHL for complete details.

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TO-14 Compound List $225 (39 chemicals with total hydrocarbons quantitated as toluene plus the five largest peaks)

Benzene	Dichlorodifluoromethane	Ethylene Dibromide	Trichloroethylene
Bromomethane	1,1-Dichloroethane	Hexachlorobutadiene	Trichlorofluoromethane
Carbon Tetrachloride	1,2-Dichloroethane	Methylene Chloride	1,1,2-Trichlorotrifluoroethane
Chlorobenzene	1,1-Dichloroethylene	Styrene	1,2,4-Trimethylbenzene
Chloroethane	*cis*-1,2-Dichloroethylene	1,1,2,2-Tetrachloroethane	1,3,5-Trimethylbenzene
Chloroform	1,2-Dichloropropane	Tetrachloroethylene	Vinyl Chloride
Chloromethane	*cis*-1,3-Dichloropropene	Toluene	*m/p*-Xylene
m-Dichlorobenzene	*trans*-1,3-Dichloropropene	1,2,4-Trichlorobenzene	*o*-Xylene
o-Dichlorobenzene	Dichlorotetrafluoroethane	1,1,1-Trichloroethane	
p-Dichlorobenzene	Ethyl Benzene	1,1,2-Trichloroethane	

TO-15 Compound List $275 (82 chemicals with total hydrocarbons quantitated as toluene plus the five largest peaks)

Acetone	Cumene	Ethanol	2-Propanol
Acetonitrile	Cyclohexane	Ethyl Acetate	Propene
Acrylonitrile	Dibromochloromethane	Ethyl Acrylate	Styrene
Allyl Chloride	1,2-Dibromo-3-chloropropane	Ethyl Benzene	1,1,1,2-Tetrachloroethane
Benzene	*m*-Dichlorobenzene	Ethylene Dibromide	1,1,2,2-Tetrachloroethane
Benzyl Chloride	*o*-Dichlorobenzene	4-Ethyltoluene	Tetrachloroethylene
Bromodichloromethane	*p*-Dichlorobenzene	Heptane	1,1,1,2-Tetrafluoroethane
Bromoethane	Dichlorodifluoromethane	Hexachlorobutadiene	Tetrahydrofuran
Bromoethene	1,1-Dichloroethane	*n*-Hexane	Toluene
Bromoform	1,2-Dichloroethane	4-Isopropyltoluene	1,2,4-Trichlorobenzene
Bromomethane	1,1-Dichloroethylene	Isooctane	1,1,1-Trichloroethane
1,3-Butadiene	*cis*-1,2-Dichloroethylene	Methanol	1,1,2-Trichloroethane
Butylbenzene	*trans*-1,2-Dichloroethylene	Methyl tert-Butyl Ether	Trichloroethylene
sec-Butylbenzene	1,2-Dichloropropane	Methyl Butyl Ketone	Trichlorofluoromethane
Carbon Disulfide	1,3-Dichloropropane	Methyl Ethyl Ketone	1,1,2-Trichlorotrifluoroethane
Carbon Tetrachloride	*cis*-1,3-Dichloropropene	Methyl Iodide	1,2,4-Trimethylbenzene
Chlorobenzene	*trans*-1,3-Dichloropropene	Methyl Isobutyl Ketone	1,3,5-Trimethylbenzene
Chloroethane	Dichlorotetrafluoroethane	Methyl Methacrylate	Vinyl Acetate
Chloroform	1,4-Dioxane	Methylene Chloride	Vinyl Chloride
Chloromethane	Epichlorohydrin	4-Phenylcyclohexene	*m/p*-Xylene, *o*-Xylene

Custom Compound List $175 (includes total hydrocarbons quantitated as toluene plus the five largest peaks)
Choose up to five of the 82 chemicals from the TO-15 scan listed above to make your own custom scan.

LEED (USGBC - Leadership in Energy and Environmental Design) $175
Includes 4-phenylcyclohexene and total hydrocarbons quantitated as toluene plus the five largest peaks.
Add formaldehyde to your LEED analysis for $50 per sample.

MVOC $175 (40 chemicals with total hydrocarbons quantitated as toluene plus the five largest peaks)
See separate information sheet "Microbial Volatile Organic Compounds – MVOC" for specifics.

Sulfurs/Mercaptans $300 (29 chemicals with total hydrocarbons quantitated as toluene plus the five largest peaks)

Allyl Disulfide	*sec*-Butyl Mercaptan	Dimethyl Sulfide	Isopropyl Mercaptan
Allyl Mercaptan	*tert*-Butyl Mercaptan	Ethyl Mercaptan	Methyl Mercaptan
Allyl Sulfide	Butyl Sulfide	2-ethyl Thiophene	2-methyl Thiophene
Amyl Mercaptan	Carbon Disulfide	Heptyl Mercaptan	Propyl Disulfide
sec-Butyl Disulfide	Carbonyl Sulfide	Hexyl Mercaptan	Propyl Mercaptan
tert-Butyl Disulfide	Diethyl Sulfide	Hydrogen Sulfide	Propyl Sulfide
Butyl Mercaptan	Dimethyl Disulfide	Isobutyl Mercaptan	Tetrahydrothiophene
			Thiophene

Custom Compound Analysis (includes total hydrocarbons quantitated as toluene plus the five largest peaks)
Please contact EHL to discuss any chemical not listed above to determine if it is a good candidate for Minican analysis.

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