TheReporter

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SUPELCO

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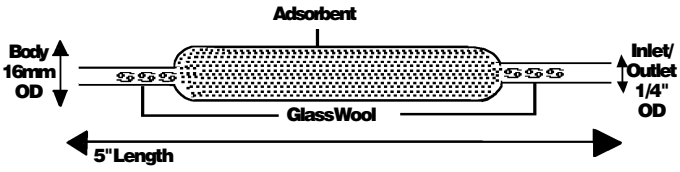
Analyze Stack Emissions, Using VOST Air Sampling Tubes and Capillary GC

I. DeGraff

United States Environmental Protection Agency SW-846, Method 0030, Volatile Organic Sampling Train (VOST), describes the sampling of emissions from hazardous waste incinerator stacks. Supelco's VOST air sampling tubes are designed to fulfill the method requirements and provide low background levels.

VOST air sampling tubes (Figure A) meet the specifications for US EPA SW-846, Method 0030, Volatile Organic Sampling Train, which explains how to sample for volatile compounds (boiling point range 30-100°C) in emissions from hazardous waste incinerator stacks. The VOST tubes — VOST 100 and VOST 200 — trap these emissions for thermal desorption and gas chromatography/mass spectrometry (GC/MS) analysis.

Figure A. Structure of a VOST Tube



The high-purity adsorbents used in VOST tubes provide consistently low background levels (Table 1). VOST 100 tubes are packed with Tenax® TA 35/60, a porous material based on 2,6-diphenylene oxide polymer that traps volatile and semivolatile compounds and has a low affinity for water and methanol. VOST 200 tubes are packed with Tenax TA 35/60 and petroleum charcoal 20/40 (2:1 by volume). Petroleum charcoal is a naturally occurring adsorbent that traps the more volatile compounds.

The two tubes are assembled in a sampling train in series, with the VOST 100 followed by the VOST 200 as a back-up to trap the more volatile compounds. At flow rates between 250-1000mL/min, a total volume of 5-20L of air is collected on each VOST pair. Up to six VOST pairs can be used to collect samples from the same source, by replacing each pair after a maximum of 20L has been collected.

Table 1. Quality Assurance Specifications

Background:	<20ng single component by GC/FID
Surrogate Recovery:	50-150%
Pressure Drop:	<8 inches water at 50cc/min

Following sample collection, the VOST tubes are thermally desorbed by heating and purging with an inert gas. The effluent is transferred and bubbled into organic-free water in a purge-and-trap system. Analysis is by GC/MS as described in Method 5041, *Protocol for Analysis of Sorbent Cartridges from VOST*. This analysis technique is used because the sampled tubes might contain high quantities of moisture, which could otherwise present problems in a thermal desorption system. More than the 35 compounds listed in Method 5041 can readily be collected with the VOST tubes. However, low recoveries of polar compounds may result because of poor purging efficiency from water.

Figure B compares a calibration standard at 20ng with blank VOST tubes that have been spiked with 50ng chlorobenzene-d_5 as a surrogate to monitor extraction efficiency. The chromatograms illustrate the high purity of the adsorbent, preconditioned and ready to use. The GC conditions encompass the elution range of the target compounds from the EPA method. Peaks comprising the calibration standard represent the most commonly found adsorbent contaminants.

Each VOST tube is sealed with stainless steel Swagelok® end fittings and enclosed in a screw-capped glass storage container that holds a charcoal packet to maintain sample integrity. The storage container is then packed in a protective flex tube. Each batch of VOST tubes is tested for recovery, background, and presure drop. Quality specifications are listed in Table 1. In addition, each tube has a certificate of analysis and a unique serial number, which ensures accurate sample identification. Tubes can be reused following conditioning with inert gas at temperatures 10-15°C above the desorption temperature.

We can make VOST tubes to your specifications. Choose your own type of tube material, dimensions, or adsorbent. Quotations and prototypes are available upon request. Contact our Technical Service chemists for more information.

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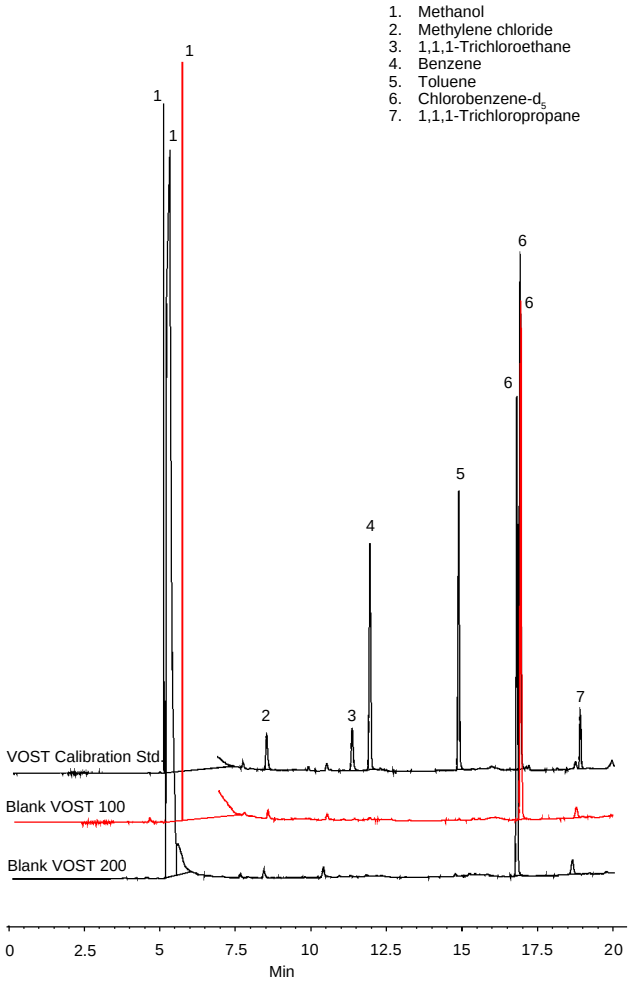
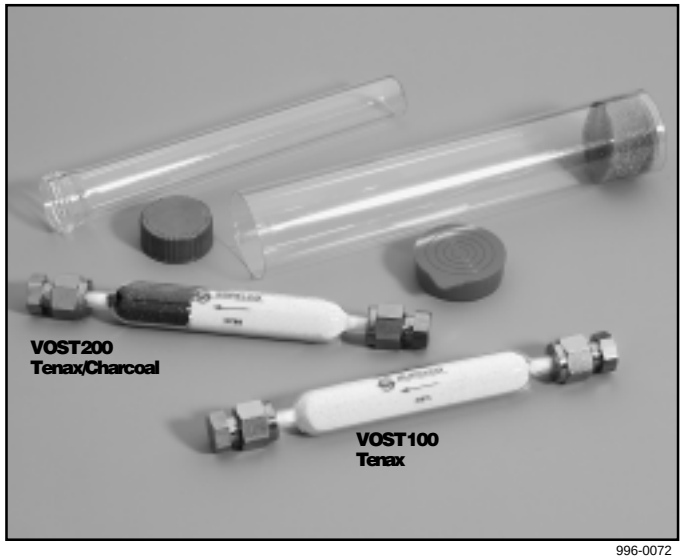
Figure B. VOST Tubes Exhibit Low Background

Sampling Tubes: **VOST 100 (Cat. No. 20074-U)**
VOST 200 (Cat. No. 20075-U)
Purge Trap: **VOCARB™-4000**
Cat. No.: **20308**
Column: **SPB™-624, 75m x 0.53mm ID x 3.0µm film**
Cat. No.: **25432**
Oven: 35°C (5min) to 200°C at 10°C/min, hold 2min
Carrier: helium, 8mL/min
Det.: FID, 300°C



796-0314, 0315, 0316

Ordering Information:



996-0072

Description	Cat. No.
VOST 100 (Tenax TA)	**20074-U**
VOST 200 (Tenax TA and petroleum charcoal)	**20075-U**
Empty Glass Tube, 11.5cm x 16mm ID	**21993**
Glass Storage Container	**21998**
SPB-624 Fused Silica Capillary Column, 75m x 0.53mm ID, 3.0µm film	**25432**
VOCARB-4000 Purge Trap	**20308**•

•For Tekmar® LSC-1, LSC-2, LSC-2000, LSC-4000 instruments. Refer to our catalog for traps for other instruments.

Trademarks
Swagelok — Crawford Fitting Co.
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SPB, VOCARB — Sigma-Aldrich Co.

Fused silica columns manufactured under HP US Pat. No. 4,293,415.

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