Introduction

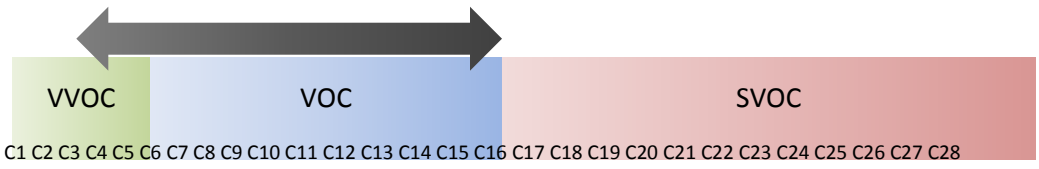
This method has been used for the characterization of environments containing mixtures of volatile organic compounds. NIOSH methods are more popular in workplace air quality monitoring, occupational safety and health (OSH), and indoor/building air evaluations.

The method allows some flexibility in tube configuration, especially for known target compounds. However, the standard configuration is illustrated with three carbon-based sorbents. Other than the primary sampling tube, the method also mentions a focusing trap made of Carbopack B and Carboxen 1000, 60/80 mesh.

NIOSH 2549 Tube Configuration

- Carbopack™ Y, 40/60, 90mg; Carbograph™ 1, 40/60, 115mg; Carboxen™ 1003, 40/60, 150mg
- Stainless Steel tubes with sorbents separated by 3 mm glass wool
- Carbograph™ 1 is equivalent to Carbopack™ B

Volatility Range C3~C16



Volatility Range – Continued

- Sample at 10 ~ 50 ml/min for a minimum sample volume of 1 L and maximum of 6 L.
- If high humidity is present, dry purge the tubes with purified helium 50 to 100 mL/min for a maximum of 3 L before desorption. Dry purge should be carried out at room temperature.

Temperatures

Maximum Temperature:	400°C
Conditioning Temperature:	350°C
Desorption Temperature:	300~325°C

Pros

- Seamless coverage of volatility range C3~C16 by the choice of three carbon-based sorbents in the standard configuration
- Very low background suitable for trace analysis
- Flexibility in tube configuration to meet specific needs

Cons

- Does not cover most of the SVOC region

Technical Guide

NIOS 2549 Tube

- NIOSH 2549 tube is a tri-bed tube suitable for active/pumped sampling of 1~6 L air
- The standard configuration of NIOSH 2549 tube is named "Carbotrap™ 349" by Supelco's nomenclature
- A popular alternative configuration is: Tenax® GR / Carbograph 1 / Carbosieve S-III. The advantage of this configuration is extended volatility range into the SVOC range

Comparison to other Tubes

- Compare to EPA TO-17 Tube Style 3, the NIOSH 2549 tube is slightly more hydrophobic, but these two tubes are more similar than different.

References

NIOSH Manual of Analytical Methods (NMAM) 2549: Volatile Organic Compounds (Screening), 4th rev. (1996), Cincinnati, OH

UK Health and Safety Executive MDHS 72 (Volatile Organic Compounds in Air), "Laboratory Method Using Pumped Solid Sorbent Tubes, Thermal Desorption and Gas Chromatography," Methods for the Determination of Hazardous Substances (MDHS), Sheffield, UK.

McCaffrey CA, MacLachlan J, Brookes BI [1994]. Adsorbent tube evaluation for the preconcentration of volatile organic compounds in air for analysis by gas chromatography-mass spectrometry. Analyst 119:897-902.

Bianchi AP, Varney MS [1992]. Sampling and analysis of volatile organic compounds in estuarine air by gas chromatography and mass spectrometry. J. Chromatogr. 643:11-23.

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