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If you have questions about applying methodology described in this article to a current application, please contact our technical service chemists.



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Analyzing Stack Gas Semivolatiles, Using Supelpak-2 Adsorbent and Capillary GC (Modified Method 5, US EPA SW-846)

I. DeGraff

The demanding detection limits required for air sampling by Modified Method 5 (US EPA SW-846, Method 0010) call for extensive cleaning and meticulous handling of the adsorbent cartridge/trap during sampling and analysis. Supelpak-2 adsorbent is cleaned in accordance with and meets the purity criteria of EPA SW-846, Method 0010, for testing semivolatile emissions from incinerator stationary sources. Under GC conditions selected to encompass the elution range of polynuclear aromatic hydrocarbons, the total chromatographable organic (TCO) content of Supelpak-2 adsorbent was measured as only 0.06µg/gram.

For decades, Amberlite® XAD®-2 adsorbent, a styrene-divinylbenzene copolymer material, has been used for adsorption of hydrophobic compounds. A dry, high-purity version of this adsorbent, Supelpak™-2, is extensively used for sampling airborne semivolatile compounds, particularly polynuclear aromatic hydrocarbons (PAHs). Source testing, as well as ambient and indoor air monitoring, can be performed with Supelpak-2 material. Physical characteristics and several applications for Supelpak-2 adsorbent are presented in Table 1. The demanding detection limits of these air sampling methods call for extensive cleaning and meticulous handling of the adsorbent cartridge/trap during sampling and analysis.

Modified Method 5 (US EPA SW-846, Method 0010)

Supelpak-2 adsorbent is cleaned in accordance with, and meets the purity criteria of, US Environmental Protection Agency SW-846, Method 0010, for testing semivolatile emissions from incinerator stationary sources. Supelpak-2 is packed into glass cartridges/

Table 1. Physical Characteristics and Uses for Supelpak-2 Adsorbent

Matrix:	polyaromatic
Mesh Size:	20-60
Surface Area:	300m ² /g
Mean Pore Diameter:	90Å

Applications

US EPA SW-846, 0010 (Modified Method 5 Sampling Train)
 US EPA SW-846, 0020 (Source Assessment Sampling System)
 TO13 (PAHs in ambient air)
 IP-7 (PAHs in indoor air)

traps (Figure A). Gaseous and particulate pollutants are collected by pumping air through the sampling train at high flow rates (>20 liters/min). After the sample is collected, the cartridge is extracted with methylene chloride, the extract is concentrated, and the sample is analyzed by GC/FID, GC/MS, or HPLC/UV.

Method 0010, Appendix B calls for a blank adsorbent cartridge to

Figure A. Supelpak-2 Adsorbent for Semivolatiles Analysis



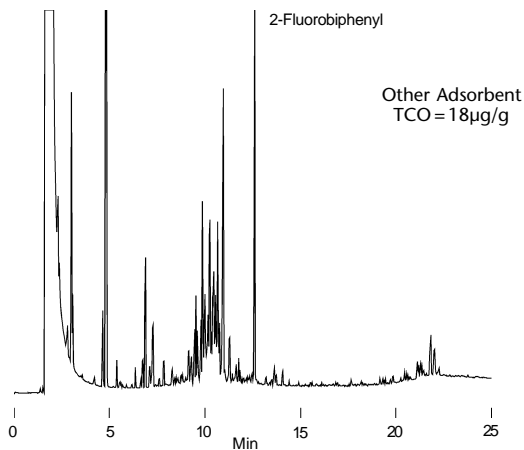
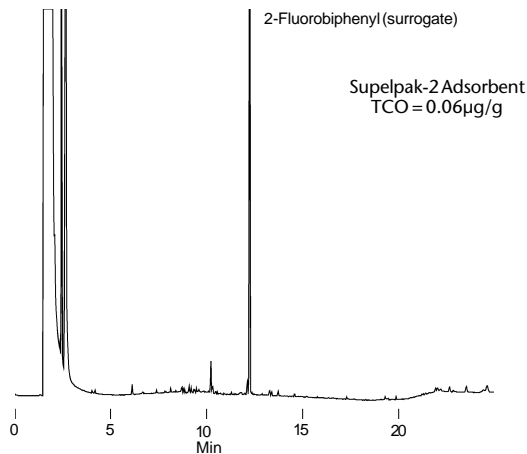
995-0259

contain no more than 10µg *total* semivolatiles per gram of adsorbent, and recommends the background be less than 4µg per gram. High purity Supelpak-2 adsorbent well exceeds these requirements. Figure B shows the total chromatographable organic (TCO) analysis for Supelpak-2 adsorbent, under GC conditions selected to encompass the elution range of PAHs. To monitor extraction efficiency a surrogate, such as 2-fluorobiphenyl, is spiked into the cartridge prior to extraction. Figure B also shows the TCO analysis of another “clean” XAD-2 material. Clearly, Supelpak-2 is the cleaner material. Figure C shows the analysis of a reference standard containing heptane and perylene-d₁₂ in addition to the surrogate. Although not part of the EPA method, the reference standard is used for quantification and as retention markers.

Supelpak-2 consistently exhibits extremely low background, well below the levels required in US EPA methods. This adsorbent allows immediate, reproducible, reliable use for airborne semivolatiles analysis. As leaders in resin cleaning technology, we also are able and willing to fulfill your custom-adsorbent and custom purification needs – simply contact our highly qualified Technical Service chemists with your questions.

Figure B. Negligible Background in Supelpak-2 Adsorbent

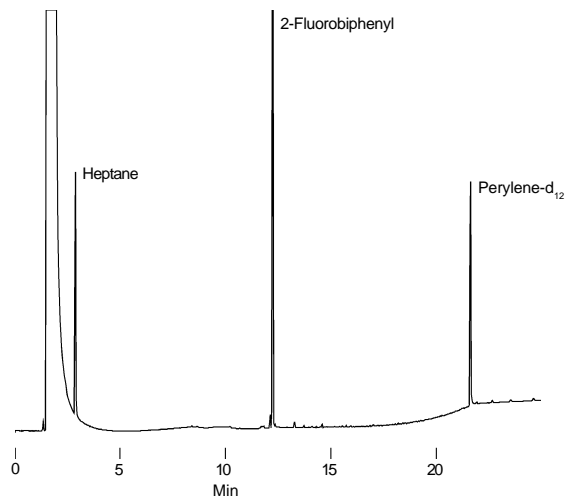
Column: **SPB™-5, 30m x 0.53mm ID, 0.50µm film**
 Cat. No.: **25317**
 Oven: 40°C (4 min) to 300°C at 15°C/min, hold 4 min
 Carrier: helium, 6cc/min (nitrogen make-up gas, 40cc/min)
 Det.: FID, 320°C
 Inj.: 1µL, direct, 220°C



795-0633,0634

Figure C. Reference Standard

Column: **SPB™-5, 30m x 0.53mm ID, 0.50µm film**
 Cat. No.: **25317**
 Oven: 40°C (4 min) to 300°C at 15°C/min, hold 4 min
 Carrier: helium, 6cc/min (nitrogen make-up gas, 40cc/min)
 Det.: FID, 320°C
 Inj.: 1µL, direct, 220°C



795-0635

Ordering Information:

Description	Cat. No.
Supelpak-2 Adsorbent, 100g	20279
Glass Holder	20563
SPB-5 Capillary GC Column, 30m x 0.53mm ID, 0.50µm film	25317

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