

# TheReporter

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# New Perkin-Elmer Thermal Desorption Tubes for Analyzing Toxic Organic Compounds in Air

S.A. Hazard, J.L. Brown (Supelco)

A. Tipler (Perkin-Elmer Corp.)

*Supelco, with many years of adsorbent tube experience, and Perkin-Elmer, with its expertise in instrumentation, are joining efforts to offer excellent products for thermal desorption air sampling applications. PE's new Air Toxics adsorbent tubes, packed with Supelco adsorbents, represent a new method for collecting TO-14 analytes that compares favorably with collection by canister.*

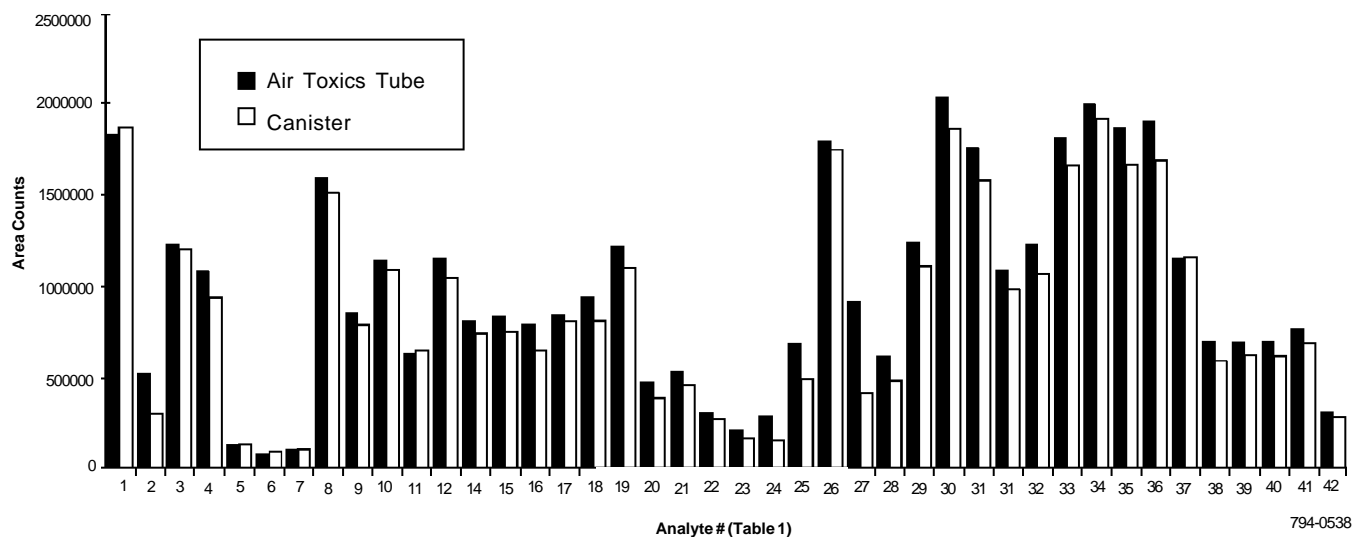
Collection of toxic organic compounds from air as specified in US Environmental Protection Agency (EPA) Compendium Method TO-14 has primarily been done using canisters. Recently, however, Perkin-Elmer Corp., using Supelco™ adsorbents, developed an adsorbent tube for collecting analytes specified in this method—as well as some additional polar analytes under consideration for the proposed TO-15 method — at sub-ppbv levels.

The new Air Toxics™ adsorbent tube is compatible with Perkin-Elmer® ATD instruments, and recently has been shown to provide recovery and precision values comparable to canister technology (1). Desorption of the analytes from the Air Toxics tube using an ATD instrument does not require the use of liquid cryogen for analyte preconcentration or for subsequent chromatographic separation. Additionally, the hydrophobic nature and the specific amounts of each of the adsorbents used in the Air Toxics tube minimizes water uptake during sampling.

Table 1 lists the precision values of samples desorbed from Air Toxics tubes. This recovery method was compared with sample recovery using canisters (Figure A). The equivalency between the two collection methods is evident. A second desorption of the Air Toxics tube shows no significant carryover of analytes from the initial analysis (Figure B).

Thermal desorption tubes for Perkin-Elmer ATD instruments containing other adsorbents are also available for a wide variety of applications and are packed in PE-certified stainless steel or glass tubes. The tubes are fully compatible with all PE ATD instruments, and each is marked with a unique serial number for unmistakable identification. These tubes are specially tested to ensure low background after undergoing an extensive conditioning procedure. A representative chromatogram showing this low background is included with each set of tubes. The tubes are sealed with Swagelok® endcaps and Teflon® ferrules to maintain sample integrity during shipment.

**Figure A. Equivalent Analyte Recovery from Canister Sample and Air Toxics Tube Sample**

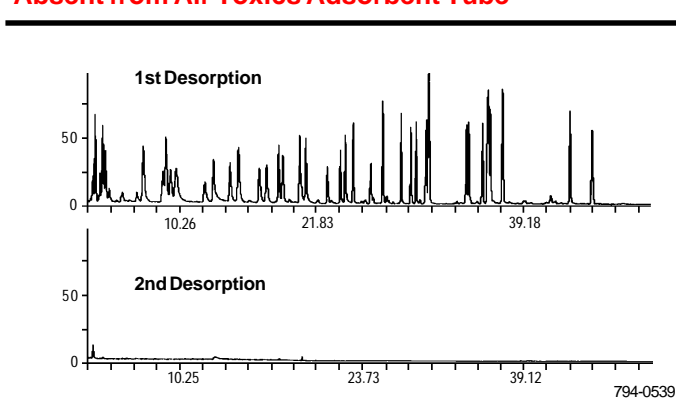


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**Table 1. %RSD of TO-14 Analytes Using a Mass Spectrometer and an Air Toxics Adsorbent Tube**

Analyte	%RSD of Peak Areas (n = 5)
1. Freon® 12	2.85
2. Methyl chloride	6.39
3. Freon 114	3.81
4. Vinyl chloride	3.95
5. 1,3-Butadiene*	13.01
6. Bromomethane	16.55
7. Ethyl chloride	5.71
8. Freon 11	2.94
9. Vinylidene chloride	5.54
10. Dichloromethane	7.68
11. 3-Chloropropene	6.50
12. Freon 13	3.01
13. 1,1-Dichloroethane	4.13
14. cis-1,2-Dichloroethylene	3.75
15. Chloroform	3.66
16. 1,2-Dichloroethane	5.36
17. Methylchloroform	2.50
18. Benzene	5.68
19. Carbon tetrachloride	1.83
20. 1,2-Dichloropropane	4.01
21. Trichloroethene	4.05
22. cis-1,3-Dichloropropene	17.57
23. trans-1,3-Dichloropropene	17.83
24. 1,1,2-Trichloroethane	3.53
25. Toluene	3.69
26. 1,2-Dibromomethane	14.73
27. Tetrachloroethene	1.12
28. Chlorobenzene	4.14
29. Ethylbenzene	4.16
30. m-, p-Xylene	3.88
31. Styrene	2.48
32. 1,1,2,2-Tetrachloroethane	3.56
33. o-Xylene	3.84
34. Ethyl toluene	3.21
35. 1,3,5-Trimethylbenzene	3.58
36. 1,2,4-Trimethylbenzene	2.78
37. Benzyl chloride	4.55
38. m-Dichlorobenzene	2.36
39. p-Dichlorobenzene	0.90
40. o-Dichlorobenzene	2.04
41. 1,2,4-Trichlorobenzene	1.27
42. Hexachlorobutadiene	1.37

\*Not included in the US EPA TO-14 list of target compounds.

**Figure B. Artifact and Carryover Effects Absent from Air Toxics Adsorbent Tube****Ordering Information:****Prepacked Sampling Tubes, pk. of 10<sup>4</sup>**

Description	Cat. No.
<b>Stainless Steel</b>	
Carbotrap™ 300	25050
Carbopack B	25052
Carbosieve™ S-III <sup>®</sup>	25053
Tenax® GR	25054
Tenax TA	25055
Chromosorb® 106	25056-U
<b>Glass</b>	
Carbotrap 300	25085
Air Toxics	25086
Carbopack B	25087
Carbosieve S-III	25088
Tenax GR	25089
Tenax TA	25090-U
Chromosorb 106	25091

On request, ATD tubes are available with adsorbents not listed here.

<sup>†</sup>All materials in the prepacked tubes are 60/80 mesh. Carbotrap 300 adsorbent is a combination of Carbopack C, Carbopack B, and Carbosieve S-III adsorbents.

<sup>®</sup>German Pat. No. 1935500. Patent holder — Badische Anilin- & Soda-Fabrik Aktiengesellschaft.

**Acknowledgement**

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**Reference**

1. Tipler, A., R. Dang, and H. Hoberecht, *A System for the Determination of Trace-Level Polar and Non-Polar Toxic Organic Compounds in Air*, Proceedings of the US EPA/AWMA Symposium on Measurement of Toxic and Related Air Pollutants, Air Waste Management Association, Durham, NC, USA, 1994.

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