

Analysis of Volatiles from Printed Circuit Boards With the CDS Model 6500 Thermal Desorption Autosampler

The volatile materials released from electronic components such as printed circuit boards may be analyzed by headspace techniques, including thermal desorption, in which a sample material is warmed and purged to a trap to collect and concentrate the volatilized analytes. After trapping, the volatiles are thermally desorbed from the trap and transferred to a gas chromatograph for analysis. The CDS Analytical Model 6500 Autosampler may be equipped with sample chambers as large as 95 mm in diameter and 110 mm in depth, so entire components may be sampled intact. To facilitate purging of such large vessels, a built-in vacuum pulls the atmosphere from the vessel, eliminating the need to pressurize the sample chamber, which may be operated from ambient to 300 °C.

Figure 1 shows the volatiles collected from a small circuit board (70 x 80 mm, without components), heated to 100 °C and purged with Helium at 50 ml/min for 20 minutes. The collected volatiles were backflushed at 300 °C to a GC-MS equipped with a 30 m column operated with a 40:1 split ratio.

Results from a similar board are shown in Figure 2, but this board included components which had been soldered into place. Table 1 lists some of the compounds recovered from the circuit boards, including toluene, benzaldehyde and dichlorobenzene in both samples, with the addition of tetrachloroethylene, acetone and xylenes in the sample with components.

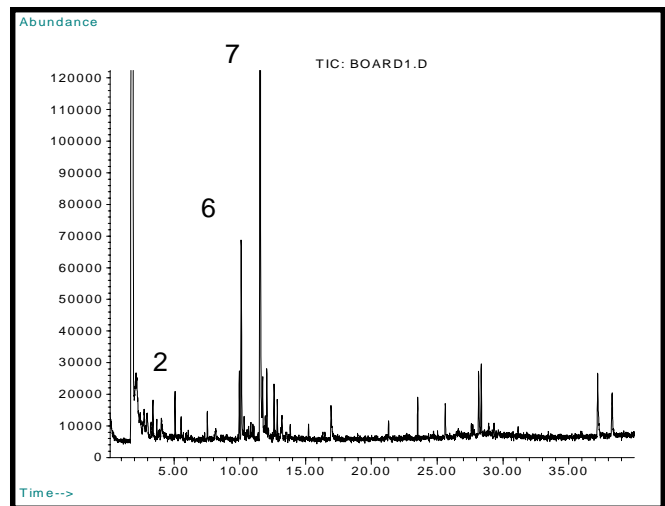


Figure 1. PCB with no components

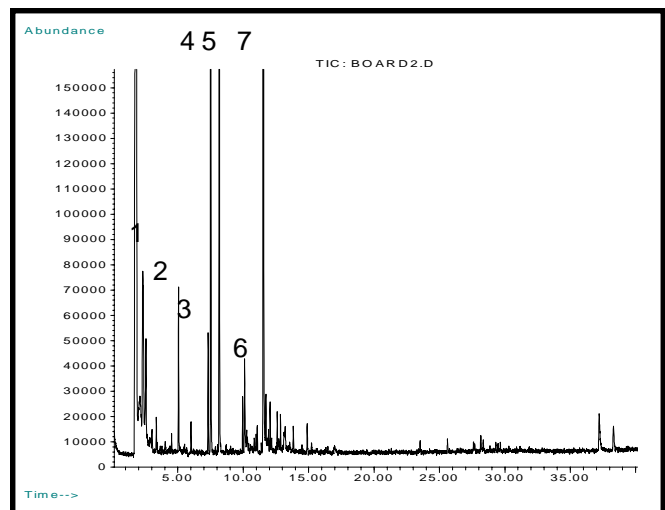


Figure 2. PCB with components attached

Equipment

All samples were thermally desorbed using a CDS Model 6500 Autosampler interfaced to a Hewlett-Packard 6890 gas chromatograph with a mass selective detector.

Model 6500 Conditions

Valve oven: 300 °C
Temperature: 100 °C
Time: 20 min
Purge: 50 ml/min
Vacuum pump, He replacement gas

Gas Chromatograph Conditions

Carrier: He
Column: HP-5
30 m x 0.25 mm
Split: 40:1
Initial temperature: 40 °C for 2 min
Ramp: 6 °C/min
Final temperature: 290 °C for 10 min

Table 1

1	Acetone
2	Toluene
3	Tetrachloroethylene
4	p-Xylene
5	m-Xylene
6	Benzaldehyde
7	Dichlorobenzene

For more information concerning this application, we recommend the following reading:

T. P. Wampler, Thermal Desorption for GC Sample Preparation, *LC GC*, 16 (3) 812 (1998).

T. P. Wampler, Analysis of Food Volatiles using Headspace-GC Techniques, in R. Marsili (Ed.) *Techniques for Analyzing Food Aroma*, Marcel Dekker, New York, 1997.

Additional literature on this and related applications may be obtained by contacting your local CDS Analytical representative, or directly from CDS at the address below.

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frm.c.64/1198



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