

CDSolutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Ink Analysis by Thermal Desorption using the CDS TDA 9300

The term "thermal desorption" is defined as a technique in which volatile gases in air are passed through a sample tube containing a solid sorbent (like Tenax) and are adsorbed onto the packing. The tube is then heated and the volatiles are desorbed and carried (using either N₂ or He gas) to a focusing trap containing adsorbent. The trap is then heated and the volatiles are desorbed to a suitable analyzer such as a GC and/or MS. This technique is applicable not only to the monitoring of air, but can be extended to soils, powdered samples, as well as liquids (using empty fritted thermal desorption tubes).

This application note deals with thermal desorption analysis of common newspaper and generic copier paper, both blank as well as printed. Both paper types were prepared by cutting them into 4 cm x 0.5 cm strips. The strips were moistened with water to aid in component release, and then placed into 8mm fritted glass thermal desorption tubes which were placed in the TDA. The CDS TDA 9300 Autosampler was interfaced to a Varian CP 3800 Gas Chromatograph, and a Varian Saturn 2000 Ion Trap was used as the detector. Samples were desorbed at 200°C for 10 minutes and the trap desorbed at 275°C for 5 minutes.

Figure 1 is a chromatogram of a generic white copier paper. This paper showed minimal background peak elution (an indication of a highly purified cellulose). A peak at 8.17 minutes was identified as Toluene. Figure 2 shows a characteristic fingerprint or marker peaks of an HP25 tricolor Ink Jet Cartridge printed on the generic white paper. Figure 3 shows the chromatogram of ordinary newspaper stock (unprinted). This minimally refined paper product shows traces of a substituted thiophene, and benzene.

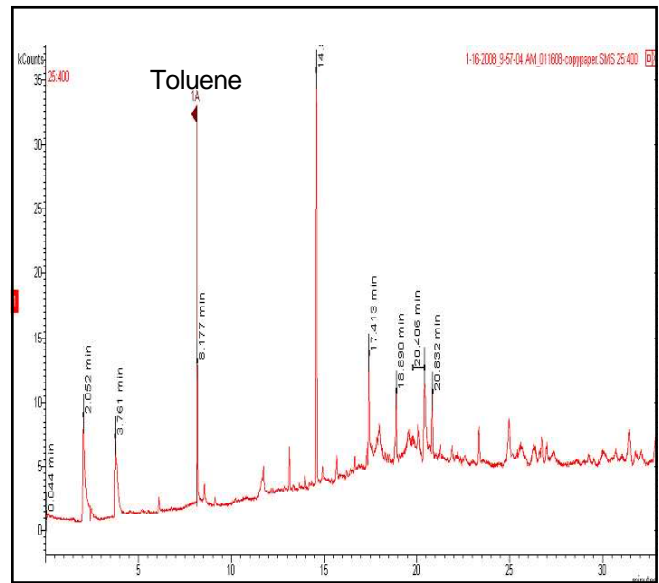


Figure 1. White Paper.

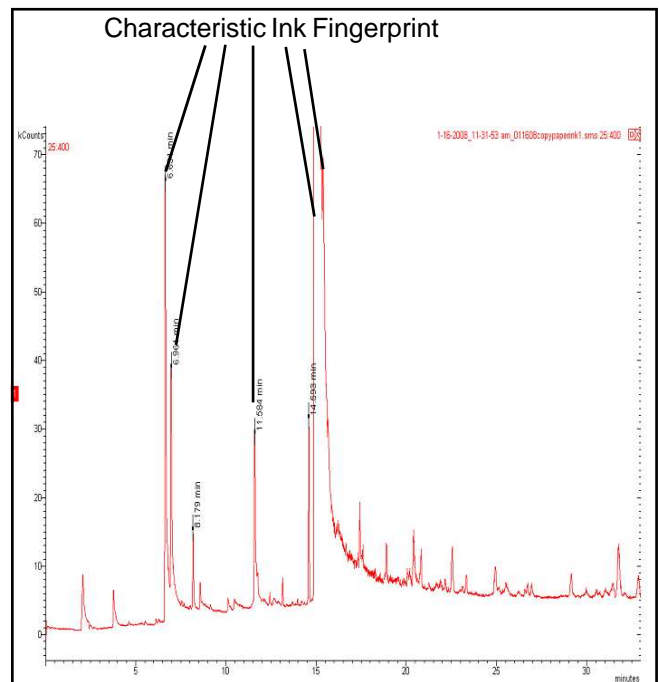


Figure 2. HP25 Tricolor Ink on white paper.

The chromatogram in figure 4 is newspaper print with black ink. The markers noted for this black newspaper ink are a series of homologous long chain alcohols.

Thermal desorption provides an easy way to identify different types of papers and inks used by comparing the fingerprints of the paper and the chemical constituents of the inks.

Equipment

These samples were analyzed using the CDS TDA 9300 Autosampler interfaced to a Varian CP 3800 Gas Chromatograph. The detector was a Varian Saturn 2000 Ion Trap.

CDS TDA 9300 Conditions

Valve Oven: 250°C
 Transferline: 250°C
 Sample Tube: 200°C for 10 minutes
 Trap Heat: 275°C for 5 minutes

GC/MS Conditions

Column: CP-Select 624 CB, DF=1.4
 30m x 0.25mm
 Carrier: He 20:1 Split, 1.2ml/min
 Oven: 40°C for 2 minutes
 10°C /minute to 300°C

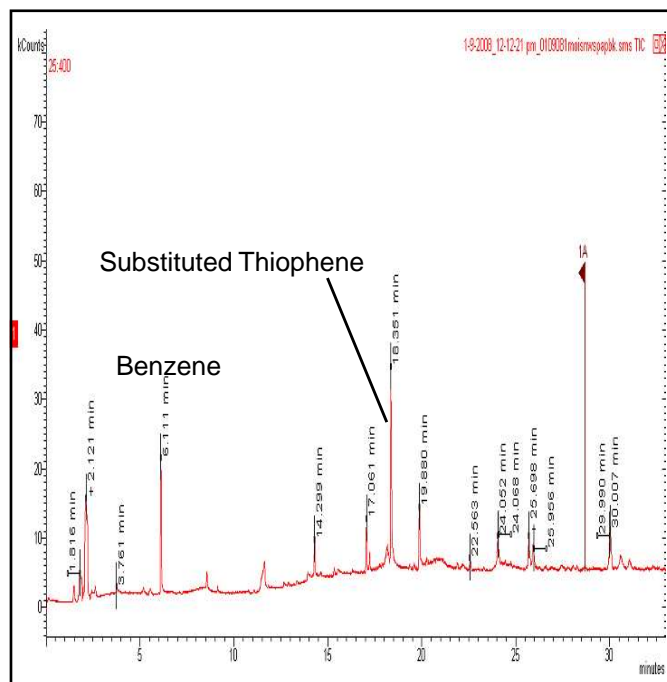


Figure 3. Newspaper Stock.

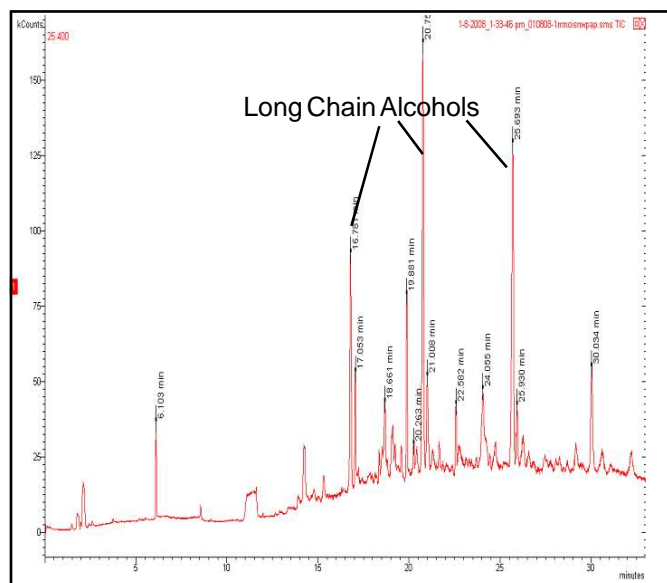


Figure 4. Newspaper Stock (Black Ink)

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