

### Carpet Volatile Emissions With the DYNATHERM TDA AUTOSAMPLER

Almost every product or material used in the interior of a building produces some sort of outgassing. These products include carpet, tile, adhesives, paints, wallcovering, window shades, and so on. These emissions are referred to as VOC's or Volatile Organic Compounds, and some of these can be harmful to human health. Due to these health risks, indoor air quality standards have been developed.

According to the Carpet and Rug Institute, VOC's of interest in new carpeting include 4-PCH (4-Phenylcyclohexene) the so called "new carpet smell" as well as vinyl acetate, styrene, dodecanol, and acetaldehyde.

Thermal desorption involves trapping volatiles on a suitable sorbent (like Tenax) tube and analyzing by GC or GC/MS. A sample of carpet (7.5 cm x 7.5 cm) was placed into an 800 ml sealed dynamic headspace vessel, which was purged with a flow of air. An exterior vent port containing a Tenax sampling tube collected carpet volatiles purged over a period of one hour. The sampling tube was desorbed using the TDA interfaced to an ACEM 9300 containing a Tenax focussing trap. The focussing trap was desorbed to the GC/MS.

Figure 1 shows carpet volatiles collected after one hour. They include styrene (1), 4-PCH (2), and dodecanol (3). Figure 2 shows carpet standard volatile compound linearities using spiked sample tubes of various concentrations and the TDA.

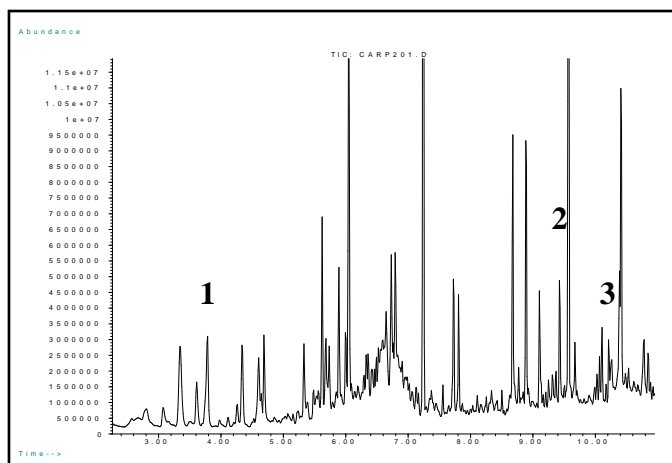


Figure 1. Carpet volatiles.

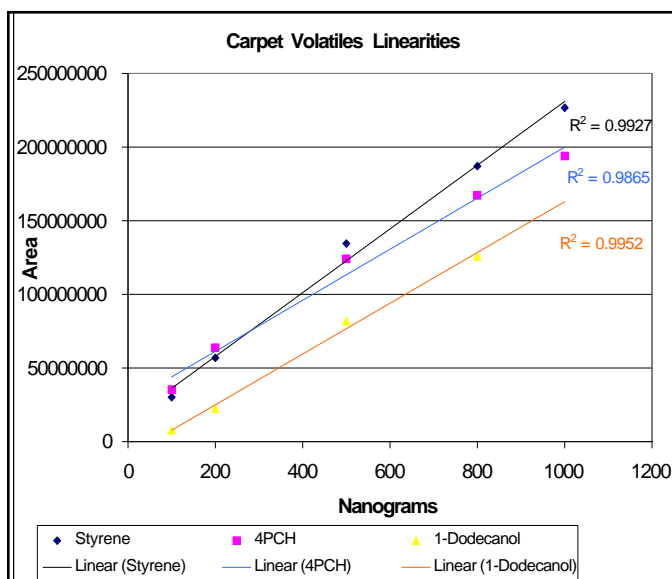


Figure 2. Carpet volatiles linearity with TDA.

## Equipment

These samples were analyzed using the CDS 800ml Dynamic Headspace Vessel (modified). The carpet volatiles were thermally desorbed using the TDA 9300 interfaced to an ACEM 9300. This instrument in turn was interfaced to an Agilent 6850 Network GC System.

## CDS 800ml DHS Vessel Conditions

Purge Flow (He): 50 ml/min  
Purge Time: 1 Hour

## TDA 9300/ACEM 9300 Conditions

Valve Oven: 300°C  
Transfer Line: 260°C  
Dry Tube: 100°C/5min  
Tube Heat: 350°C/7min  
Trap Heat: 300°C/7min  
Aux 1: 350°C

## GC Conditions:

Carrier: Helium  
Column: HP-5MS (30m x 0.25mm x 0.25µm)  
Detector: MSD  
GC Program:  
Initial: 40°C/2min  
Ramp: 15°C/min  
Final: 210°C

## Carpet Volatile Reproducibility of 4-Phenylcyclohexene

15 Individual Station Runs of 200ng/µl Spike of 4-PCH:

Average Area Count::  $4.25 \times 10^7$

Standard Deviation:  $8 \times 10^4$

% Relative Standard Deviation: 1.87

## Acknowledgements:

Special thanks to G&F Carpet of Oxford PA for carpet samples and Agilent Technologies for use of their Agilent 6850 Network GC System.



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