CDS olutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Drying Time Paint Emission Determination Using The CDS 9300 Autosampler

Of the many sources of atmospheric pollution inside a home, the emission of volatile organic compounds (VOC) from drying paint is significant. Modern paint formulations are composed of pigments, binders and solvents. The solvents used in commercial paints range from mineral spirits to water. Latex paints use a variery of polymers and employ solvents like water or an organic solvent system. Most water based systems produce smaller amounts of gaseous emission VOC. Oil based paints use organic solvent systems and produce larger quantities of gaseous VOC emissions.

Thermal desorption involves the trapping of volatiles onto a suitable adsorbent like Tenax, and desorbing them utilizing the CDS 9300 Thermal Desorption Autosampler interfaced to a GC/MS. Each paint sample was applied to one side of a 4" x 1.5" x 0.5" piece of sheetrock. The painted sheetrock was placed inside an 800 ml Dynamic Headspace Vessel which was then sealed. An ambient air flow of 100ml/min (from a tank) through the vessel was established using a flow controller. An adapter on the vessel vent allows placement of a standard 6mm three bed (Tenax,Carboxen 1000, and Carbosieve SIII) thermal desorption tube to collect the volatiles. After an appropriate vessel purge, a sample was collected for one hour. The sample tube was desorbed at 350°C for 5 minutes and the sample trap at 325°C for 5 minutes. The GC program was 32°C/5min, 8°C/min to 160°C, hold for 20min. Figure 1 shows the elution profile from the sheet rock blank and Figure 2 from a latex paint sample. Figure 3 is a sample of a different latex paint (note C12-C16 alkanes) and Figure 4 shows overlays of the TICs from the sheetrock blank, and the volatiles collected after four and six hours of drying.

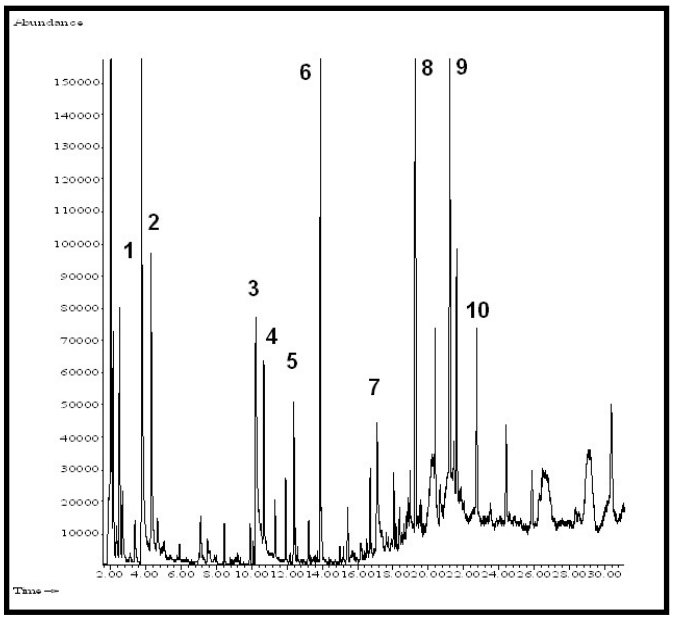

Figure 1. Sheetrock blank.

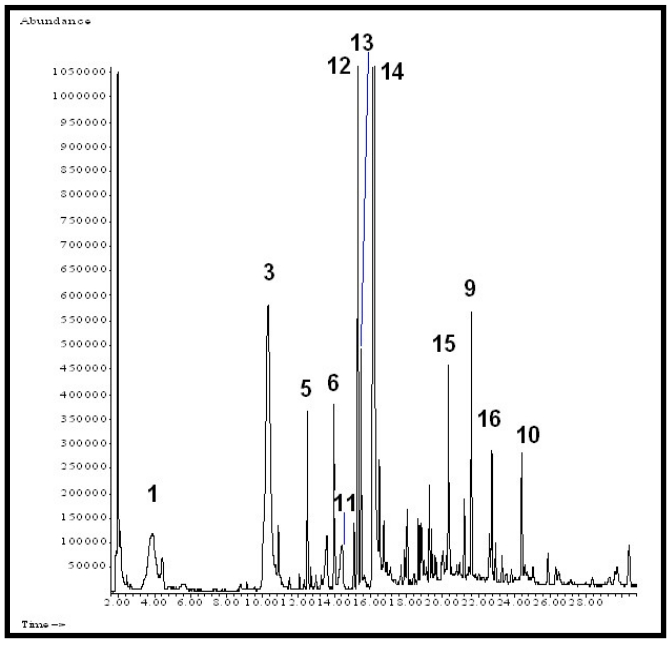

Figure 2. Sheetrock with latex paint a.

Equipment

These samples were analyzed using the CDS TDA 9300 interfaced to an Agilent 6890 Gas Chromatograph. The detector used was an Agilent 5973 MSD. The optional 800ml dynamic headspace vessel and flow controller were also used.

TDA Conditions

Valve Oven: 300°C
Transfer Line: 300°C
Tube Idle: 35°C
Tube Heat: 350°C/5min
Trap Heat: 325°C/5min
Aux: 300°C

GC/MS Conditions

Carrier: Helium
Column: HP-5MS (30m x .25mm x 0.25µm)
Detector: MSD

GC Program

Initial: 32°C/5min
Rate : 8°C/min to 160°C
Final: 160°C for 20 minute hold

Table 1

1. Ethanol	11. 2,5-Dimethyl-p-Dioxane
2. Acetone	12. n-Butyl Ether
3. Butanol	13. p-Xylene
4. Pentanol	14. n-Hexanol
5 Toluene	15. Isobutyl Tiglate
6. Hexanal	16. Tetradecane
7. Heptanal	
8. Limonene	
9. Nonanal	
10.Dodecanal	

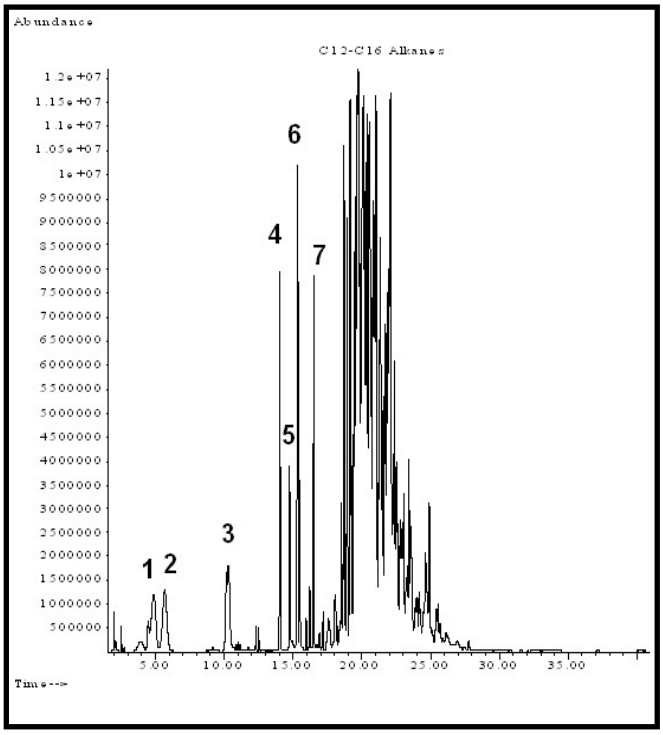

Figure 3. Sheetrock with latex paint b.

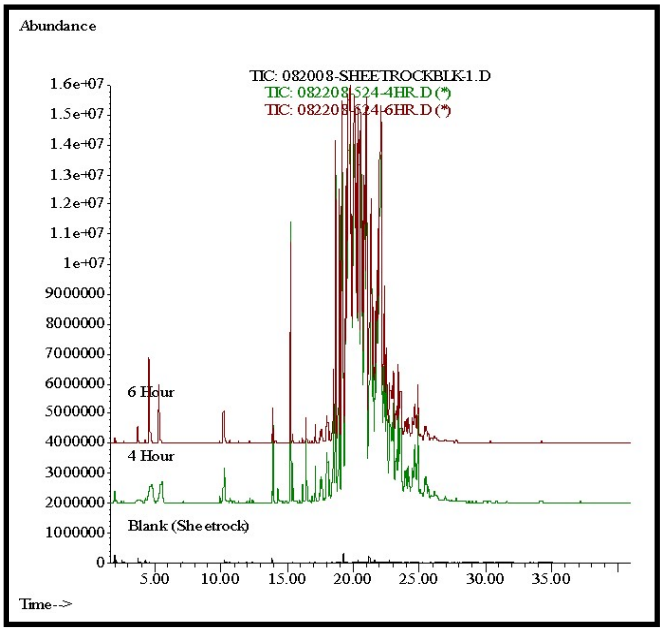

Figure 4. Blank, 4 hour and 6 hour runs.

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