Drying Time Paint Emission Determination

Application Note
Environment

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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 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 He 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 then desorbed to a GC/MS. 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.

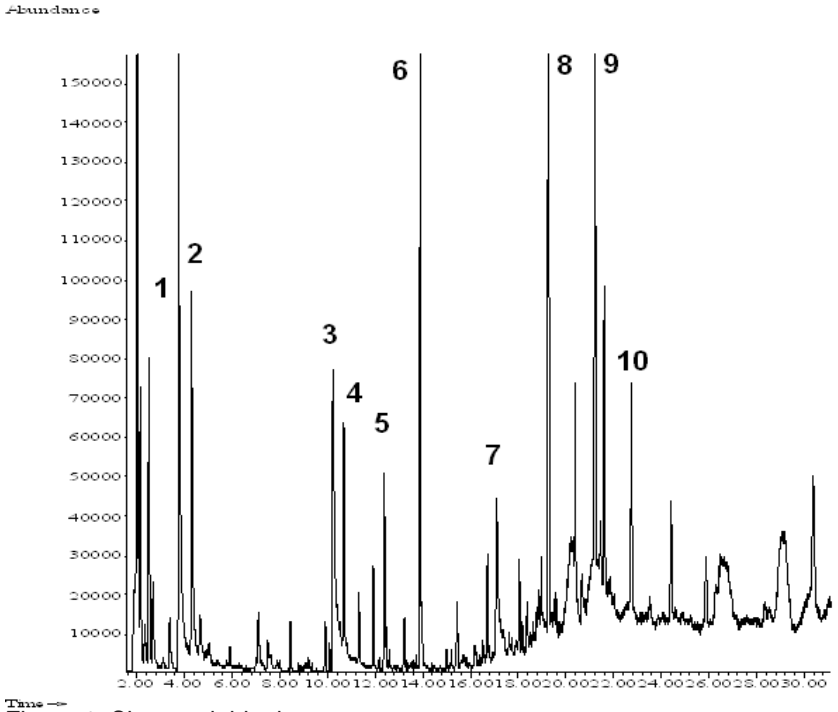

Figure 1. Sheetrock blank.

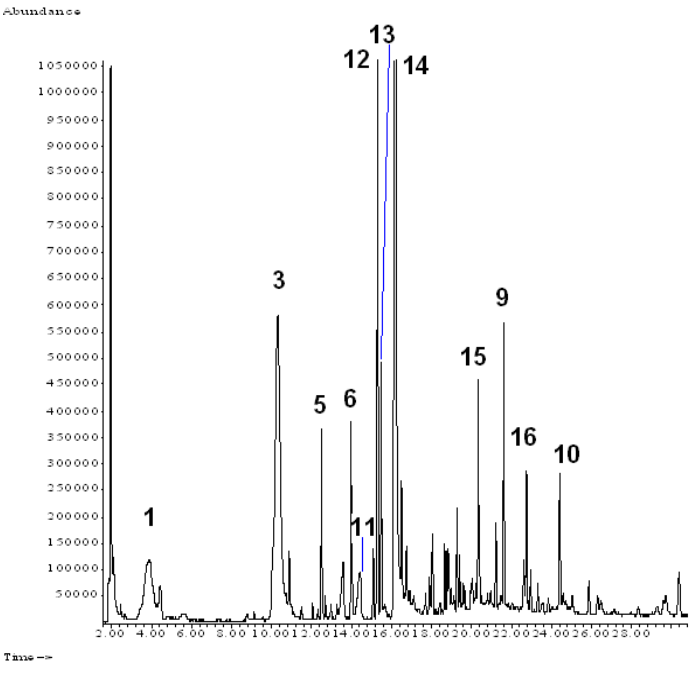

Figure 2. Sheetrock with latex paint a.

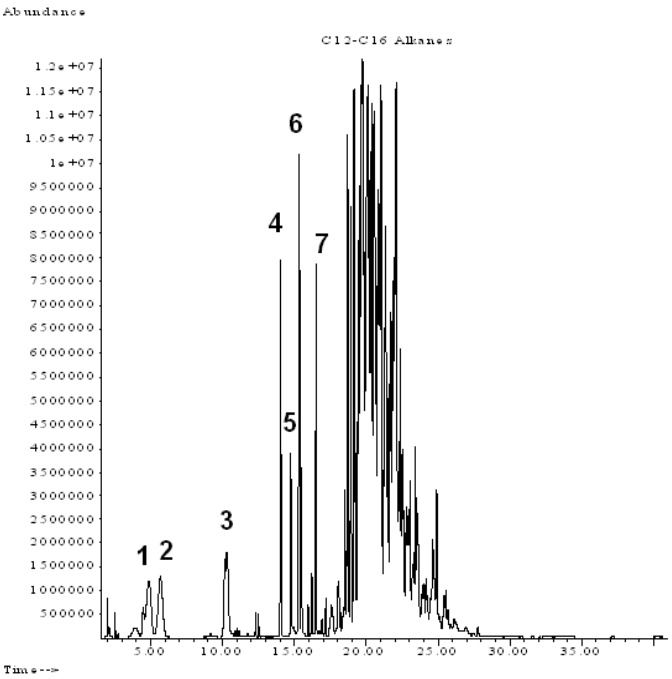

Figure 3. Sheetrock with latex paint b.

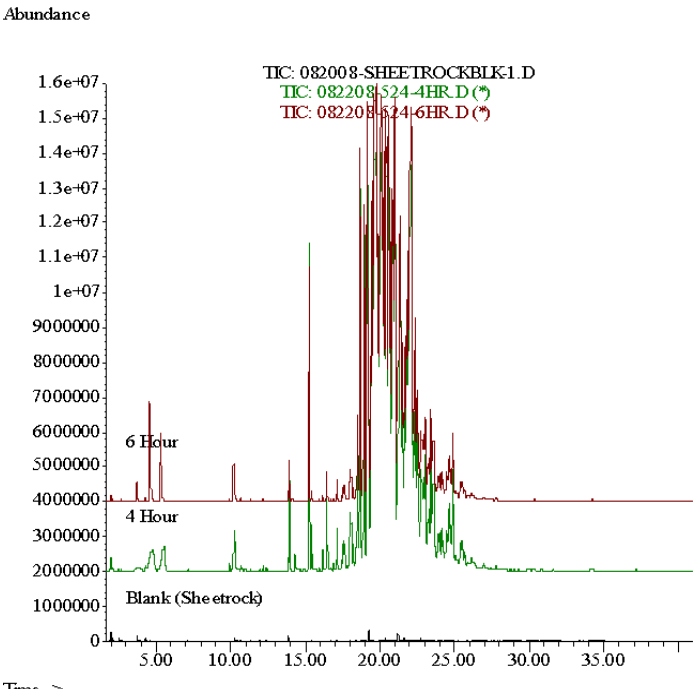

Figure 4. Blank, 4 hour and 6 hour runs.

CDS 800mL DHS Vessel

Purge Flow: He, 100mL/min
Purge Time: 60 minutes

CDS Autosampler Dynatherm 9300

Valve Oven: 300°C
Transfer Line: 300°C
Tube Heat: 350°C 5 minutes
Trap Heat: 325°C 5 minutes

GC/MS

Column: 5% phenyl (30m x 0.25mm x 0.25μm)
Carrier: Helium, 50:1 split
Injector: 250°C
Program: 32°C/5min, 8°C/min to 160°C/20min

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