CDS solutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Analysis of a Layered Paint Sample using Pyrotomy

Samples comprised of multiple layers, such as laminated or coated papers, painted polymers, packaging and multilayered paint sytems may be applied to the platinum filament of a Pyroprobe and analyzed by applying short bursts of heat to work sequentially through the layers. This technique, called Pyrotomy, is also useful in determining surface contamination and the presence of additives on the outside of the polymer, such as mold-release compounds. The sample is heated for a second or less, then cooled to prevent further degradation while the products are analyzed by the GC/MS.

The paint sample shown here was analyzed using a ribbon filament, heated to 500°C for 1 second to generate the first three GC runs. In the first run, multiple monomers seen frequently in paints are detected, including styrene, methyl methacrylate and butyl acrylate. In addition, a diisocyanate (peak 7, hexane diisocyanate) is present, indicating a polyurethane. In the next two runs, more of these compounds are produced, especially butyl methacrylate.

For run number 4, the temperature was increased to 600°C, again for just one second, which produced a second diisocyanate (peak 9).

A fifth run, at 750°C, shows more aromatics, including alpha-methyl styrene, in addition to the styrene and acrylics seen in previous runs.

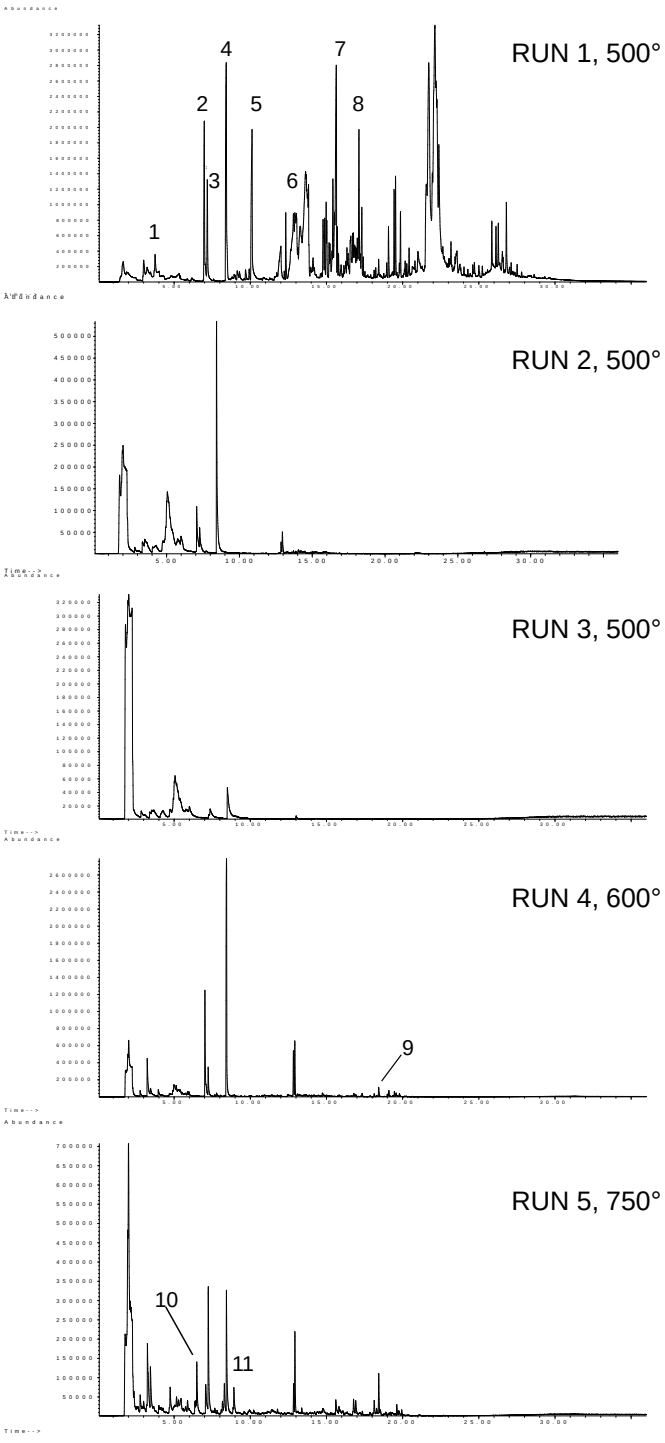

Table 1. Peak Identification

1. Methyl methacrylate
2. Butyl acrylate
3. Styrene
4. Butyl methacrylate
5. Hydroxyethyl methacrylate
6. Fatty acids
7. Hexane diisocyanate
8. Tributyl phosphate
9. 5-isocyanato,1-isocyanatomethyl trimethyl cyclohexane
10. Toluene
11. Alpha methyl Styrene

Equipment

These samples were analyzed using a CDS Model 5200 Pyroprobe, interfaced to an Agilent 6890/5973 gas chromatograph/mass spectrometer.

Model 5200 Conditions

Valve Oven:	250°C
Transfer Line:	300°C
Temperature:	500, 600 and 750°C
Time:	1 second
Mode:	Pyrolysis
Trap:	NA

GC Conditions

Carrier:	Helium
Column:	35% phenyl, methyl silicone (30m X 0.25mm)
Detector:	Agilent 5973 MSD

GC Program:

Initial:	40°C for 2 minutes
Ramp:	10°C/min.
Final:	300°C

FOR MORE INFORMATION CONCERNING THIS APPLICATION, WE RECOMMEND THE FOLLOWING READING:

T. P. Wampler, G. A. Bishea and W. J. Simonsick, Recent Changes in Automotive Paint Formulations using Pyrolysis-Gas Chromatography/Mass Spectrometry for Identification, J. Anal. Appl. Pyrolysis, 40-41 (1997) 79-89.

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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