

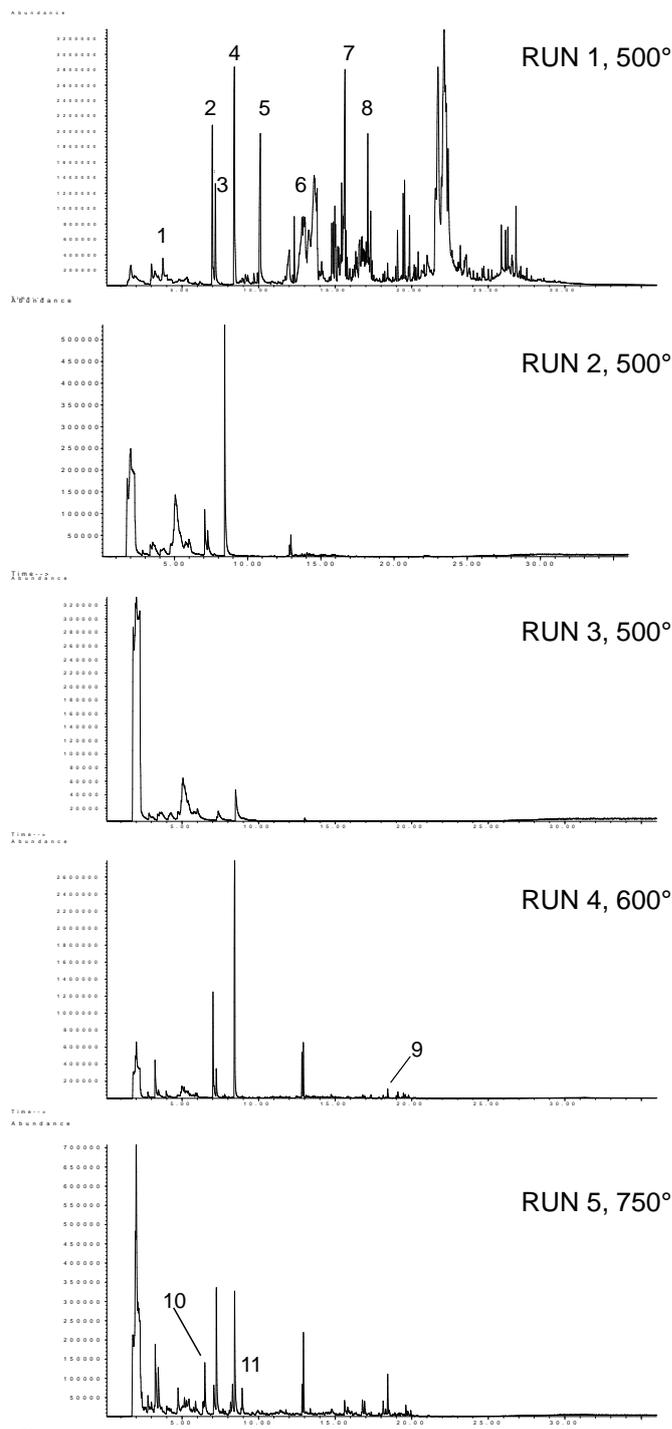
### Analysis of a Layered Paint Sample using Pyrotomy

Samples comprised of multiple layers, such as laminated or coated papers, painted polymers, packaging and multilayered paint systems 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.

CDS Analytical, Inc. has been a leader in the design and manufacture of laboratory instruments for sample preparation and analysis since 1969. We are dedicated to providing the best possible instruments for both research and routine analysis. Well known in the field of pyrolysis, CDS manufactures the Pyroprobe® 5000, 5150, 5200 and 5250 autosampler for the introduction and analysis of solid materials by GC, MS and FT-IR. CDS offers a complete line of dynamic headspace instruments for the analysis of volatile organic compounds in environmental, pharmaceutical and food applications, including the model 8400 four-position autosampler for complex, multicomponent materials investigation. Our customers, their requirements and applications are important to us. To help meet your needs, we offer a wide range of analytical information and the services of our applications laboratory. If you would like additional information, please contact us at the address below, call us at 1 800 541 6593, or log onto [cdsanalytical.com](http://cdsanalytical.com).