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CDS Solutions

APPLICATIONS INFORMATION USING ADVANCED GC SAMPLE HANDLING TECHNOLOGY

Analysis of Cosmetics by Pyrolysis GC

Many samples the analyst encounters will contain a great many components. Some samples are very difficult to analyze because of this complexity. Pyrolysis and/or multiple step pyrolysis can help simplify matters. Cosmetics, for example, contain organic pigments, solvents and polymers. In order to obtain information about the polymer content of cosmetics, it is usually beneficial to eliminate the solvents and lower boiling organic constituents. Once this is accomplished, higher temperature pyrolysis can be used to fragment the polymers in the sample. The fragments produced give both qualitative and quantitative data on the polymers within the sample.

Two different mascara samples were pyrolyzed at 750°C for 10 seconds. Mascara A (Figure 1) displays several noteworthy peaks. The four peaks labeled with arrows were generated by the fragmentation of beeswax to form linear hydrocarbons. Secondly, the region between 12 and 18 minutes is indicative of the organic pigment used for coloring.

Mascara B was then pyrolyzed under the same conditions. The four peaks labeled by arrows in Figure 2 once again identify the hydrocarbons generated from pyrolysis of beeswax. Mascara B, however, exhibits a major component at 16 minutes in the chromatogram. This fragmentation

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Figure 1

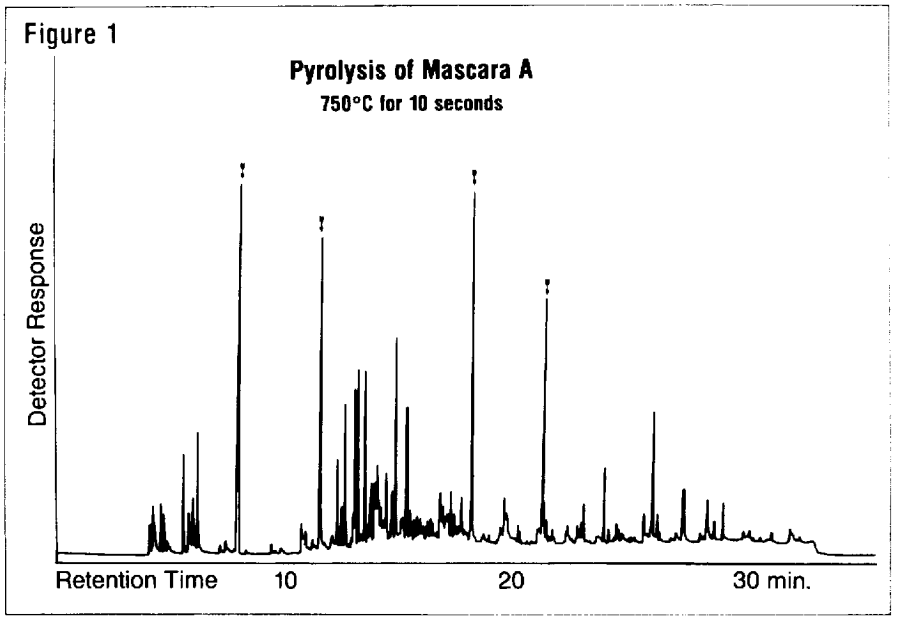
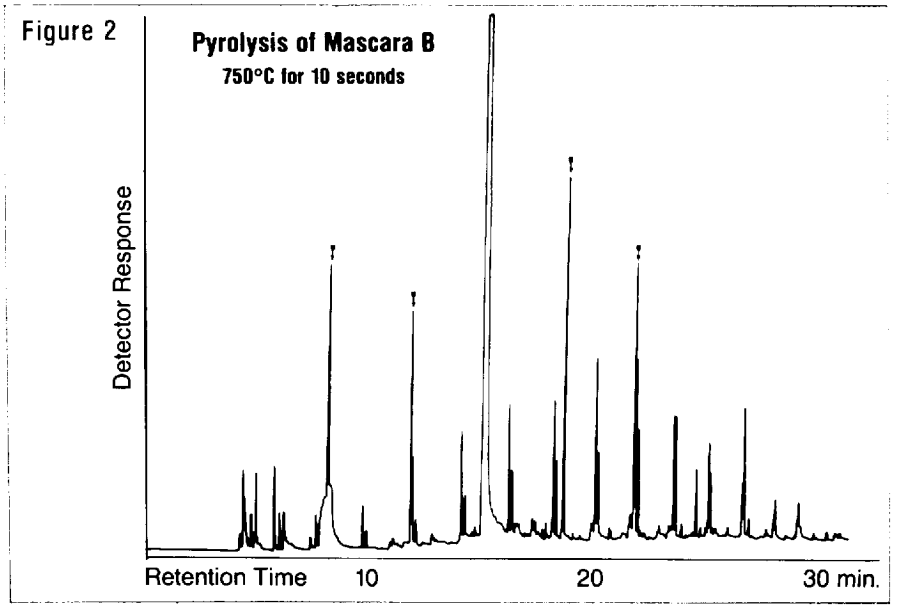


Figure 2



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pattern is indicative of an acrylate polymer. Acrylate polymers upon pyrolysis undergo an unzipping or depolymerization resulting in the formation of primarily monomeric units.

Analytical pyrolysis can be used in the analysis of pure materials as well as highly complex samples. Samples which are not volatile as such, can be pyrolyzed in order to make them compatible for GC analysis. This offers the analyst a reliable diagnostic method for the analysis of complex materials.

EQUIPMENT

PYROLYSIS

Pyroprobe 124 equipped with cryogenic refocuser at the injection port of the gas chromatograph
Pyrolysis temperature: 750°C for 10 seconds
Interface temperature: 300°C
Cryogenic temperature: -100°C for 10 minutes

GAS CHROMATOGRAPHY

Varian 3700 equipped with a flame ionization detector
Initial temperature: 40°C for 2 minutes
Ramp rate: 8°C/min. to 290°C
Column: 50m x 0.25mm SE-54 fused silica capillary
Carrier: Helium at 20 psi

For more information on this and related applications, we recommend the following readings:

Ericsson, I. "Influence of Pyrolysis Parameters on Results in Pyrolysis-Gas Chromatography." *J. Anal. Appl. Pyrol.* 8, 73-86 (1985).

Israel, S.C., Young, W.C., and Bechard, M., *J. Macromol. Sci.-Chem.*, A22 (5-7), pp. 779-801 (1985).

Additional literature may be obtained from CDS by calling 1-800-541-6593 or in Pennsylvania 215-932-3636.

ABOUT CDS

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