CDS solutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Tri-Step Analysis of Chewing Gum

Chewing gum is a complex consumer product containing a wide range of constituents both volatile and non-volatile. Successive thermal treatments followed by GC/MS can unravel the formulation by separating the various ingredients into thermal families for analysis. The fruit flavored gum shown here includes a polymer, sweeteners, flavorings, conditioners and even a plasticizer. A small piece of the gum was placed into the quartz tube of the Pyroprobe 5200, which was programmed to heat it first to 150°C, then to 300°C and finally to 700°C, starting the GC/MS each time.

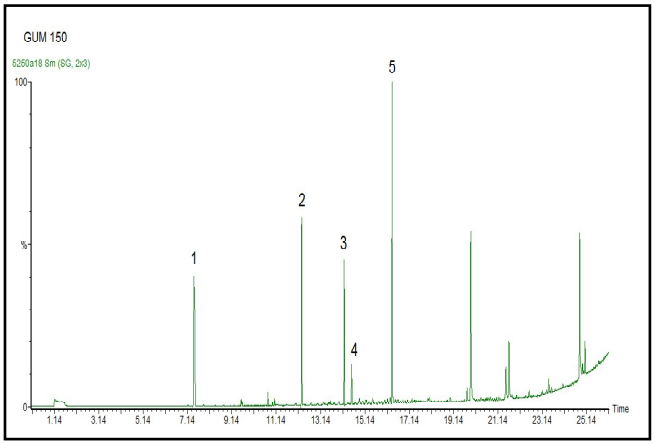

Figure 1. Chewing gum at 150°C.

By heating the sample to 150°C for a few seconds, the volatile constituents are released without damaging the non-volatile matrix. These include flavorings like limonene, and also the plasticiser triacetin, shown In Figure 1. After the sanple has been heated, it is automatically cooled to wait for the next run.

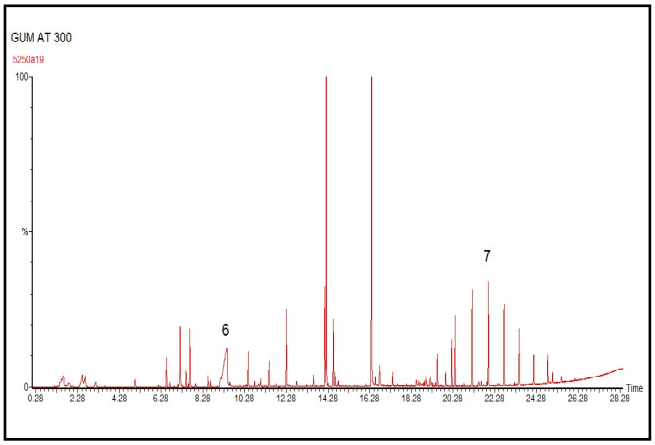

Figure 2. Chewing gum at 300°C.

As shown in Figure 2, at 300°C, peaks are seen for less volatile compounds, including glycerine and a paraffin wax, typical gum ingredients.

When the remaining sample is pyrolyzed at 750°C, a small peak is seen for acetic acid, which comes from the polymer polyvinyl acetate. But the major peaks seen are furan carboxaldehyde and hydroxymethyl furan carboxaldehyde, which are degradation products of sugar. The labeled peaks are identified in Table 1 on the rear.

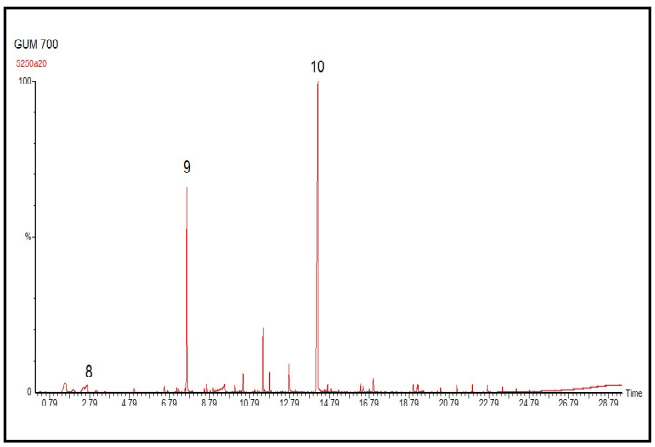

Figure 3. Chewing gum at 700°C.

This three-step approach is applicable to a variety of polymeric systems, including packaging, rubber, and consumer goods .

Table 1

Peak #	COMPOUND
1	L-LIMONENE
2	METHYL SALICYLATE
3	EUGENOL
4	CINNAMALDEHYDE
5	TRIACETIN
6	GLYCERIN
7	WAX
8	ACETIC ACID
9	2-FURANCARBOXALDEHYDE
10	2-FURANCARBOXALDEHYDE, 5-(HYDROXYMETHYL)-

Equipment

These samples were analyzed using a CDS Analytical Model 5200 Pyroprobe, interfaced to a Perkin Elmer Clarus 500 GC/MS.

Model 5200 Conditions

Valve Oven: 300°C
Interface: 150°, 300°C
Pyrolysis: 700°C
Time: 15 seconds

GC Conditions

Carrier: Helium, split 50:1
Column: 30 m x 0.25 mm 5%phenyl MS
Detector: Clarus 500 MS

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, Introduction to Pyrolysis-Capillary Gas Chromatography, J. Chromatography A, 842: 207-220 (1999).

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.

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CDS Analytical, Inc. 465 Limestone Road, P.O. Box 277, Oxford, PA USA 19363-0277 PH: 610 932 3636 FX: 610 932 4158