CDS solutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Tri-Step Analysis of Food Packaging

Thermal sampling provides a simple way to analyze products like food packaging without extractions or complicated sample preparation. In this example, a 1 mm punch of the wrapping used for a cereal bar was placed into the quartz tube of a Pyroprobe 5250 Autosampler, which was interfaced to a GC/MS.

The sample was heated first to 200°C for volatile components, then to 400°C and finally to 750°C to pyrolyze the polymer for identification.

At 200°C, as shown in Figure 1, several plasticizers were released, including phthalates. When the same sample was then heated to 400°C, two peaks for isophorone diisocyanate (IPDI) were detected. Diisocyanates are used in the production of polyurethanes, and are regenerated thermally. In the case of IPDI, there are two isomers, present at about a 3:1 ratio in the polyurethane, and both isomers are regenerated. The polyurethane could have been used in the printing on the wrapper, or as an adhesive.

When the sample was pyrolyzed at 750°C, the resulting pyrogram showed evidence of two different polymers. A complex pattern of methyl-branched alkanes resulted from the pyrolysis of polypropylene, and the trimer (dimethyl heptene) is marked in Figure 3. In addition, there are peaks for benzoic acid (marked) plus benzoate esters, indicating the presence of poly ethylene terephthalate (PET). The packaging, therefore, is a combination of PET and polypropylene, which included traces of an IPDI based polyurethane and contained traces of several plasticizers.

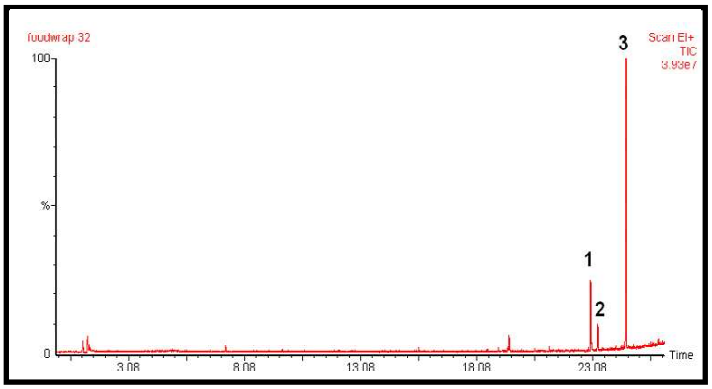

Figure 1. Cereal bar wrapper at 200°C. Peak #1, Benzyl butyl phthalate, #2, Dioctyl adipate, #3, Dioctyl phthalate.

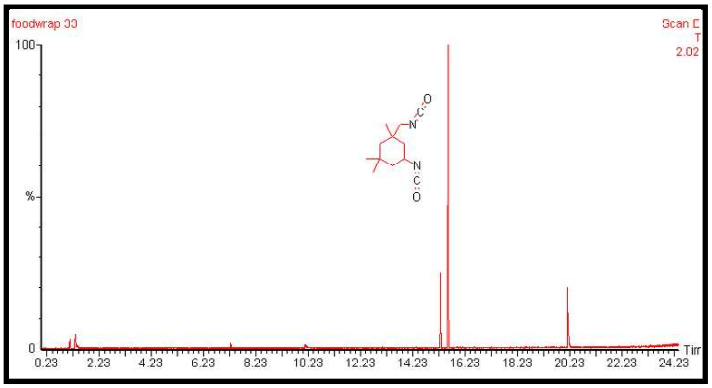

Figure 2. Wrapper at 400°C.

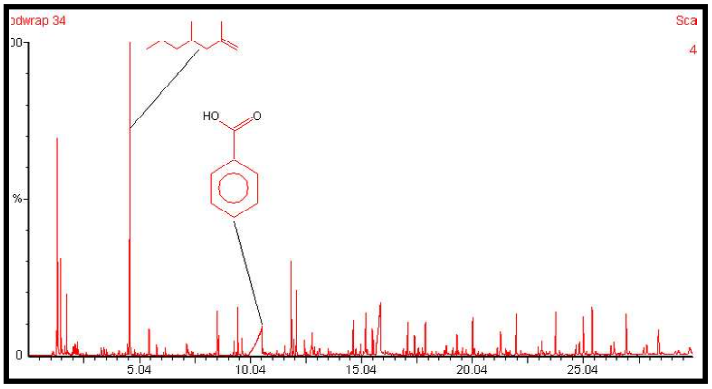

Figure 3. Wrapper at 750°C.

Experimental Conditions

Pyroprobe 5250

Valve oven:	300°C
Transfer Line:	300°C
Pyrolysis:	200°C for 30 seconds 400°C for 15 seconds 750°C for 15 seconds

Chromatography

Column:	5% phenyl methyl silicone 30 m X 0.25 mm
Oven	
Initial:	40°C for 2 minutes
Ramp:	10°C/minute
Final:	300°C for 5 minutes
Injector:	Split, 50:1 300°C
Detector	
Mass Spectrometer	
Mass range:	30 to 550 amu

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

T. P. Wampler, Introduction to pyrolysis-capillary gas chromatography, J. Chrom. A, 842 (1999) 207 - 220.

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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