



Multi-Step Analysis of Packaging Tape

Application Note

Rubber & Adhesive

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Thermal sampling techniques may replace more complex and time consuming analytical procedures such as solvent extractions by transferring volatile and semivolatile compounds directly to the GC for analysis. By selecting the appropriate temperature, or sequence of temperatures, various classes of compounds may be separated for easier analysis.

The Pyroprobe may be programmed to take the same sample material to a variety of temperatures automatically, starting the GC each time to produce a series of runs at different temperatures. In this example, a 1.25 mm circle of clear packing tape was heated first to 200°C, then 400°C and finally to 650°C.

Figure 1 shows that at 200°C only a few small peaks are produced, but these include phthalate plasticisers from the tape film. At 400°C, the largest peak is for 2-ethyl hexanol, a breakdown product from one of the acrylics used to in the adhesive. Earlier eluters include acetic acid, butanol, 3-methylene heptane and butyl acetate. Most of the compounds released from the sample at 400°C may be associated with the adhesive and not with the polymer film used for the tape itself.

In Figure 3 the remaining sample is pyrolyzed to identify the polymer film used for the tape itself. The largest peak is dimethyl heptene, the trimer of propylene, revealing that the tape is polypropylene. Other oligomers of propylene, as well as acrylic monomers from the adhesive are also seen in the pyrolysis run.

Instrument Conditions

Pyroprobe

Filament: 200°, 400°, 650°C, 10 seconds

Interface: 200°C, 300°C

Valve Oven: 275°C

Transfer Line: 275°C

GC/MS

Column: 5% phenyl (30m x 0.25mm x 0.25µm)

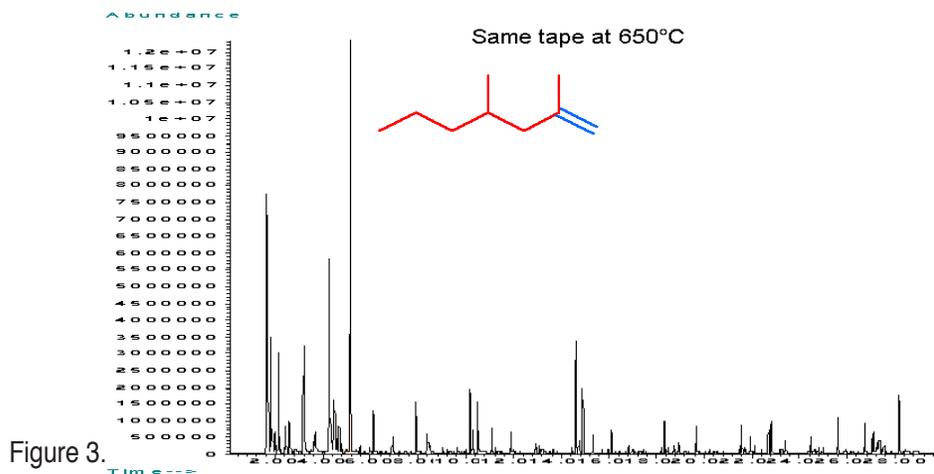
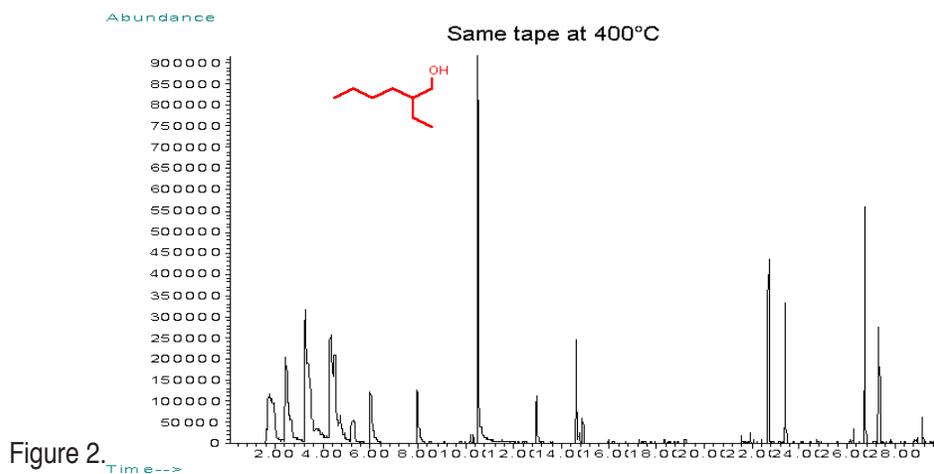
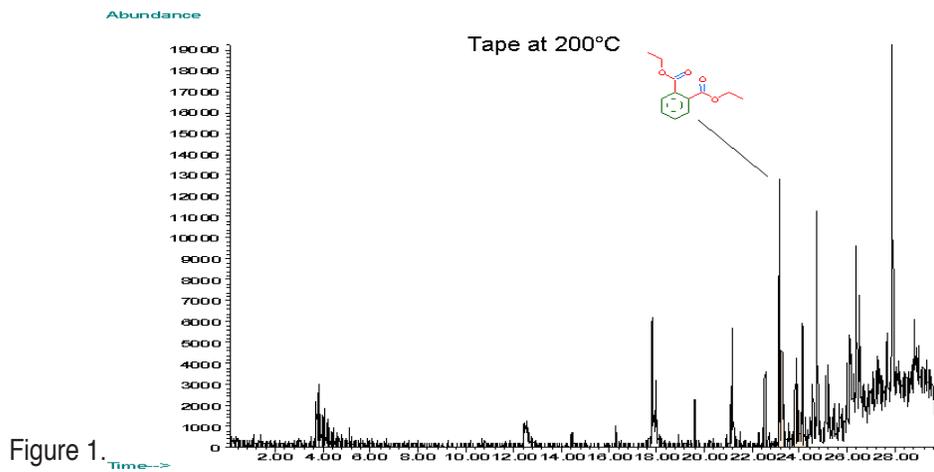
Carrier: Helium, 50:1 split

Inlet: 300°C

Oven: 40°C for 2 minutes

10°C/min to 295°C

Mass Range: 35-600 amu



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

Introduction to Pyrolysis-Capillary Gas Chromatography, T. P. Wampler, Journal of Chromatography A, 842 (1999) 207-220.