



Composition Analysis of Adhesives Using Double-Shot Pyrolyzer and Peripheral Devices

Part 2: Analysis by EGA-GC/MS Technique

If more than one peak are observed in an evolved gas (EGA) curve, EGA-GC/MS is a useful technique to determine the composition of each peak observed. In this technique, components in each temperature region are introduced into a GC column and temporary trapped at the front of the column using Selective Sampler (SS-1010E) and MicroJet Cryo-Trap (MJT-1030E). They are then separated by GC and finally identified with MS. In the EGA curve of an adhesive described in *Double-Shot Pyrolyzer® Application Note* PYA1-013E, three peaks, A, B, and C are observed (see Fig. 1). Fig. 2 shows chromatograms of three temperature regions obtained by GC analysis of each temperature region. Peak A was found to contain a phthalate ester, while peak B was found to contain acetic acid, butyl acetate, and butyl acrylate. Acetic acid is considered to arise from polyvinyl acetate (PVAc), and butyl acrylate from thermal decomposition of polybutyl acrylate. Peak C contained a variety of aromatic compounds derived from thermal decomposition of polyene structure of the polymer backbone. As demonstrated in this example, detailed analysis of polymers can be achieved by GC/MS analysis of each temperature regions of an EGA curve using a capillary column.

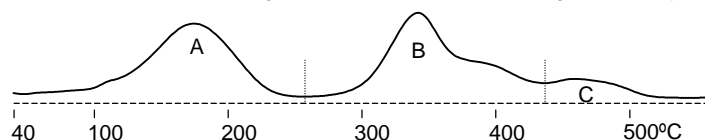


Fig. 1 EGA Curve of an Adhesive

See Double-Shot Pyrolyzer® Application Note PYA1-013E for analytical conditions

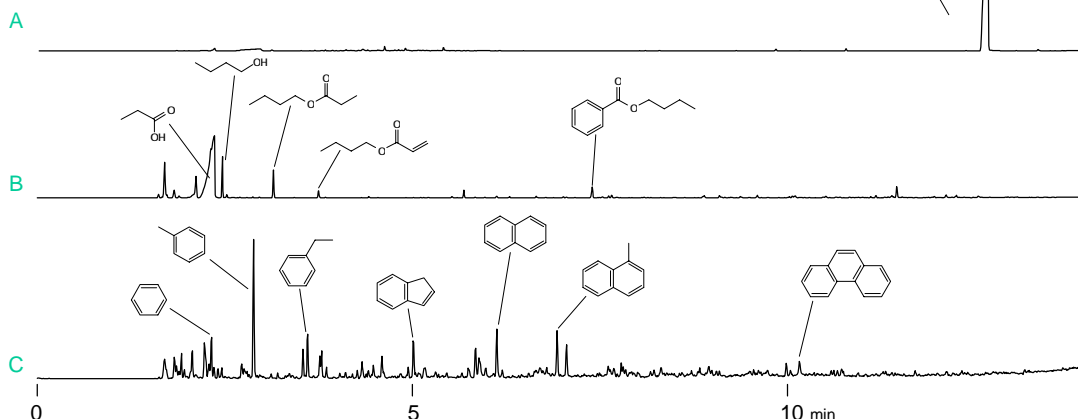
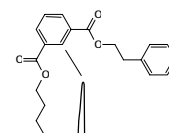


Fig. 2 Chromatograms of Each Temperature Region of Evolved Gas Curve

Pyrolysis temp.: 40°C-600°C (20°C/min), Column flow rate : 1ml/min (fixed flow rate), Split ratio : 1/50
Separation column : Ultra ALLOY+5 (5% diphenyl polysiloxane), 30m, 0.25mm id, Film thickness 0.25µm
GC oven temp.: 40°C-320°C (20°C/min), Sample : 0.8mg, Detector : MS (m/z=29-400, 2scans/sec)

Keyword : Adhesive, Selective Sampler, MicroJet Cryo Trap, EGA, EGA-GC/MS

Applications : General Polymer Analysis, Adhesive Industry

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