Analysis of Printer Toner Using Double-Shot Pyrolyzer and Peripheral Devices

Part 1 : Evolved Gas Analysis (EGA) and Library Search by EGA-MS LIB

The EGA-MS library search is a combination of Evolved Gas Analysis, a thermal analysis technique using Double-Shot Pyrolyzer, and mass spectrometry is very useful as a primary searching technique for unknowns. As an example, analysis of printer toner is described below. Fig. 1 shows the EGA curve of a printer toner and the average spectra of temperature regions A, B, and C of the curve. Judging from the elution temperatures, regions A and B are originating from the desorption of low molecular weight compounds. Region C is considered arising from thermal decomposition of polymers. Hence, a library search using EGA-MS LIB was performed on the MS spectrum of region C (Table 1), and various styrene copolymers were found as plausible polymers. As shown here, the EGA-MS and the library search by EGA-MS LIB are very useful to determine the composition of unknown polymers as a primary searching method. Also see *Double-Shot Pyrolyzer®* Application Note PYA1-019E for results of detailed analysis by GC/MS.

Table 1 Results of EGA-MS Library Search of Region C

	Ref No.	Qual
1. Methyl methacrylate-butadiene-styrene copolymer	#165	90
2. Styrene-ethylene-butadiene-styrene-block copolymer	#195	86
3. Styrene-divinylbenzene copolymer	#210	80

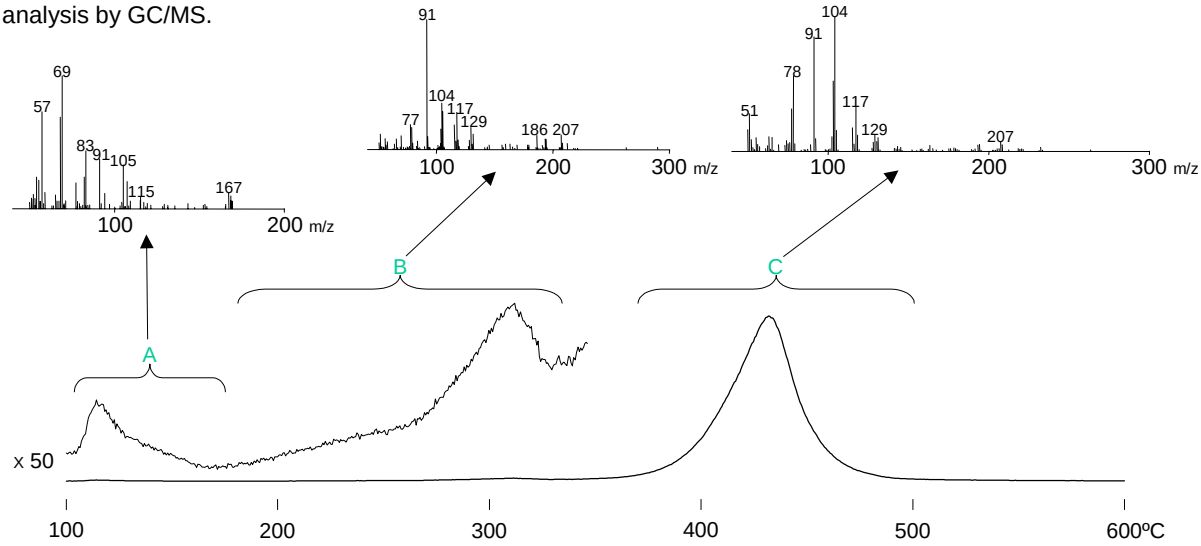

Fig. 1 EGA Curve of Printer Toner and Mass Spectra of Each Region

Pyrolysis temp.: 100~600ºC (20ºC/min), Carrier gas : He 50kPa, Split ratio : ca. 1/50
EGA capillary tube : 0.15mm id, 2.5m, (UADTM-2.5N), GC oven temp.: 300ºC
Injection temp.: 320ºC, Sample : 0.5mg, Detector : MS (m/z=50-400, 0.1Scans/sec)
PY-GC interface temp.: 320ºC (AUTO mode)

Keyword : Toner, Polystyrene Compounds, Evolved Gas Analysis, EGA-MS Library

Applications : General Polymer Analysis, Printing and Related Industries

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R&D and manufactured by:

Frontier Laboratories Ltd.
1-8-14, Saikon, Koriyama,
Fukushima, 963-8862 Japan
Phone: 81-24-935-5100 Fax: 81-24-935-5102

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