



# Analysis of Thermoset Resin Using Double-Shot Pyrolyzer and Peripheral Devices

Part 1 : Evolved Gas Analysis (EGA) and Library Search with 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; and is very useful as a primary search technique for unknowns. Described below is an analysis example of a thermoset resin. Fig. 1 shows the EGA curve of the thermoset resin and averaged spectra obtained from regions A, B, and C. The result of library search on these spectra using EGA-MS LIB is shown in Table 1. Cresol and phenol resins were found in region B, and a cresol resin was found in region C with high quality. Because of low elution temperature of region A, therefore low boiling species, a library search was done using Wiley275, a commonly used MS library and Triphenylphosphineoxide, a reaction catalyst, was found. As described here, EGA-MS technique and library search using EGA-MS LIB are extremely useful for composition analysis of unknown polymer materials as a primary search method.

Table 1 EGA-MS Library Search for Regions B and C

Region B			
Name	Ref No.	Qual	
1. Cresol formaldehyde resin (Novolak)	#165	53	
2. Cresol formaldehyde resin (Novolak)	#163	53	
3. Phenol formaldehyde resin (Novolak) : PF	#156	32	
Region C			
Name	Ref No.	Qual	
1. Cresol formaldehyde resin (Novolak)	#165	38	
2. Poly-m-phenyleneisophthalamide	#195	16	
3. Poly(phenylene oxide) : PPO	#210	10	

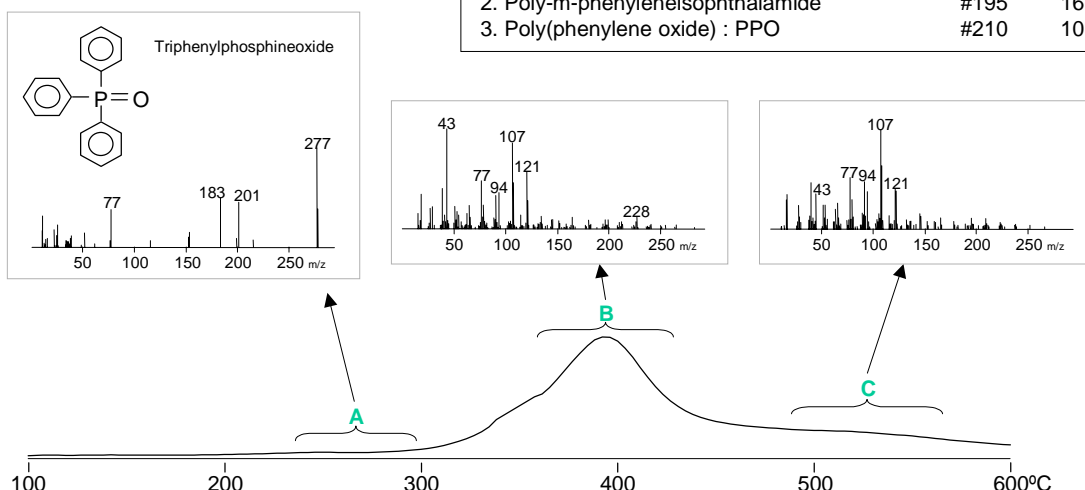


Fig. 1 EGA Curve of a Flame Retardant Resin

Furnace temp: 100~600°C (20°C/min), Carrier gas : He 50kPa, Split ratio : ca. 1/50  
EGA capillary tube : 0.15mm id, 2.5m (UADTM-2.5N), GC oven temp.: 300°C  
Injection temp.: 320°C, Sample : ca. 0.5mg, Detector : MS (m/z=10-400, 0.1Scans/sec)  
PY-GC interface temp.: 320°C (AUTO mode)

Keyword : Thermoset Resin, Evolved Gas Analysis, EGA-MS Library, Reaction Catalyst

Applications : General Polymer Analysis

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