



Analysis of Residual Oligomers in Polystyrene (PS) Part 2 : Thermal Extraction Conditions and Quantitative Analysis

Fig. 1 shows the chromatogram of components obtained by thermal extraction of residual oligomers observed in the previous Evolved Gas Analysis of PS. Among the components observed here, quantitative analysis of styrene monomer and styrene trimer was performed. Under the thermal extraction conditions shown in Fig. 2, thermal extraction of a sample was repeatedly performed, and it was found that at temperatures above 220°C, styrene oligomers produced by decomposition of PS were interfering the analysis. Thermal extraction at 200°C for 20 min was therefore found to give styrene monomer and trimer in 100% yield without thermal decomposition of PS. Quantitative analysis was done under the conditions found, and repeated five times. The results are shown in Table 1. As indicated, quantitative analysis could be made with excellent reproducibility (RSD < 2%).

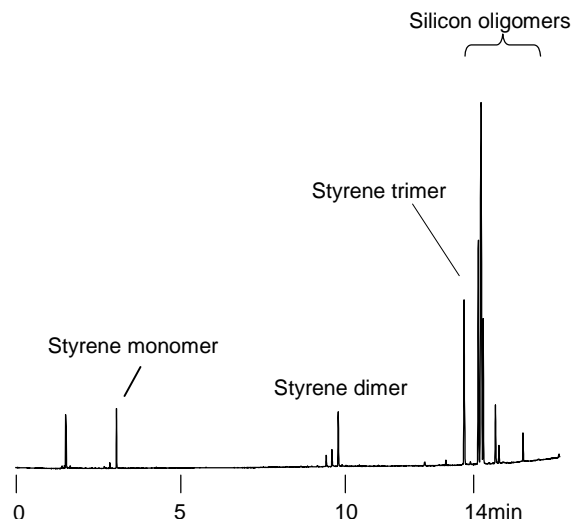


Fig. 1 Analysis of Residual Oligomers in PS

Pyrolysis furnace temp.: 40°C 20°C/min 200°C (20min)
Carrier gas : He 140kPa, 80ml/min, Split ratio : ca. 1/80
Column : 5% diphenyldimethylpolysiloxane, 30m, 0.25mm id, 0.25µm (UA5-30M-0.25F, Frontier Laboratories Ltd.)
GC oven temp.: 40°C (1min) 20°C/min 320°C
Trap temp.: -196°C (MJT-1030E, Frontier Laboratories Ltd.)
Injection port temp.: 320°C, Sample : 0.2mg, Detector : FID
PY-GC interface temp.: 320°C (AUTO mode)

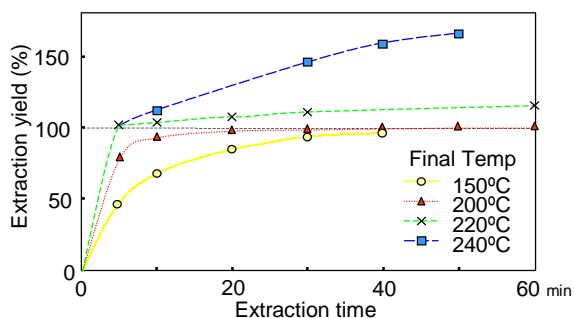


Fig. 2 Efficiency of Thermal Extraction

Heating program : 40°C Final temp (20°C/min)

Table 1. Results of Styrene Monomer/Trimer

Sample : 200µg, Temp. 40°C 20°C/min 200°C(20min)

n=5	Monomer	Trimer
Average	232 ppm	913 ppm
RSD	1.9%	1.2%

Keyword : Oligomer, Polystyrene, Thermal Extraction, Quantitative Analysis, Reproducibility

Application : Environmental pollution, Manufacturing Process, Polymers

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