

# Evolved Gas Analysis (EGA)-MS in Air Atmosphere

## Part 5: Reproducibility of peak temperature and peak area

**[Background]** In the previous note (PYA3-033E), a new flow system that solves some problems with EGA-MS in air atmosphere was developed. In this note, the reproducibility of peak temperature and peak area of EGA thermograms of polystyrene (PS) was studied using the new flow system.

**[Experimental]** About 25 mg of PS was dissolved in 1 mL of dichloromethane, and 5 µL of this solution was put in a sample cup. A thin film of about 0.125 mg was obtained by evaporating the solvent. EGA-MS measurements under the carrier gas flow of air at 10 mL/min and additional He flow at 50 mL/min were carried out using the new flow system (PYA3-033E Fig. 1(b)), and the RSD values of the peak temperature and the peak area ( $n=5$ ) were obtained. Also, the EGA-MS measurements in He atmosphere were carried out using the conventional flow system (PYA3-033E Fig. 1(a)), and the reproducibility was examined in the same manner as the experiments in air.

**[Results]** Fig. 1 shows EGA thermograms obtained by repeated measurements ( $n=5$ ). All EGA thermograms have almost the same peak profile. Table 1 shows the RSD values of the peak top temperature (average 307 °C) and peak area (average  $9 \times 10^8$ ) in air and He. As seen in Table 1, both the peak top temperature and the peak area measured in air atmosphere showed good reproducibilities (RSD values) comparable to those measured in He atmosphere.

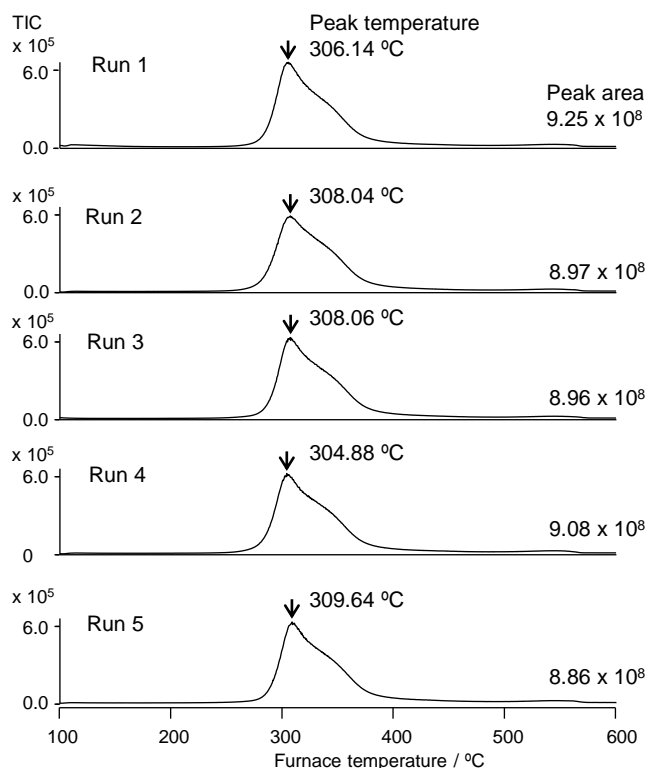


Table 1 RSD of EGA thermograms of PS ( $n=5$ )

	Peak top temperature	Peak area
In air (New flow system)	0.60 %	1.6 %
In He (Conventional flow system)	0.10 %	4.1 %

Fig. 1 EGA thermograms of PS using the new flow system (Airflow rate: 10 mL/min, Additional He flow rate: 50 mL/min)

Furnace temp.: 100 – 600 °C (20 °C/min), EGA tube: UADTM-2.5N (L=2.5 m, i.d.=0.15 mm), Airflow rate: 10 mL/min, Additional He flow rate: 50 mL/min, Split ratio: 1/60, Tube flow rate: 1 mL/min, GC oven temp.: 300 °C, MS scan range:  $m/z$  41– 400, MS scan rate: 1 scan/s, Sample amount: 0.125 mg

Reference: A. Shiono *et al.*, *J. Anal. Appl. Pyrolysis*, 156 (2021) 105122.

**Keywords :** Air atmosphere, Thermal oxidative degradation, EGA-MS, Evolved gas analysis

**Products used :** Multi-Shot pyrolyzer, Auto-Shot Sampler, UADTM-2.5N, Eco-Cup LF, Vent-free GC/MS adapter

**Applications :** General polymer analysis, Degradation evaluation, Material analysis

**Related technical notes :** PYA4-002E, PYA3-033E, PYA3-034E, PYA3-035E, PYA3-036E, PYA3-038E

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