

The comparison of ionRocket-DART®-MS and EGA-MS for nylon-6,6 analysis

[Keyword] ionRocket, EGA-MS, Mass spectrometry, DART®

[Subject area] Material analysis, Foreign material analysis, Polymer analysis, Polymer manufacturing

■ Abstract

ionRocket creates a temperature/time gradient for samples as they are subjected to DART®-MS (Direct Analysis in Real time-Mass Spectrometry) analysis: from room temperature to 600 °C at up to 100 °C/ min. EGA (Evolved Gas Analysis) is a second option for subjecting a sample to a temperature gradient during analysis by MS. In this report, we compare ionRocket-DART®-MS analysis to EGA-MS analysis.

■ Sample

Nylon-6,6

■ Method

For ionRocket analysis, samples were sliced into 0.5 mm x 0.5 mm sections and placed in a copper sample pot. The temperature gradient was applied from room temperature to 600 °C at 100 °C/min. The total run time was roughly 7 min.

For EGA-MS analysis, 10 mg sample was collected, put into the sample cup and analyzed. The temperature was raised by EGA-MS from 100 °C to 600 °C at 20 °C/min and then kept at 600 °C for 5 min. Total run time was 30 minutes.

■ Result

The results of ionRocket and EGA-MS analysis are shown in Figure 1 and 2, respectively.

Fragment ions were not observed in the ionRocket sample because DART® is a soft ionization technique which limits fragmentation. Instead, monomers and dimers were among the principal species observed (Figure 1). On the other hand, in the EGA-MS analysis fragment ions and pyrolysis products were the principal components (Figure 2B).

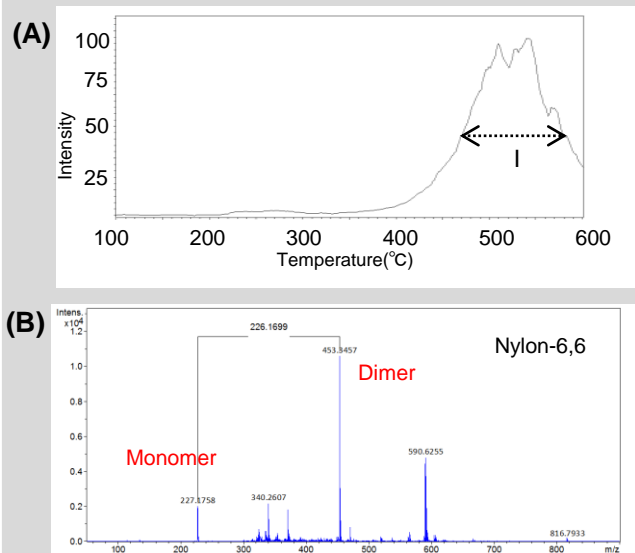


Figure 1. ionRocket analysis

(A) Thermogram (B) Mass spectrum at zone I

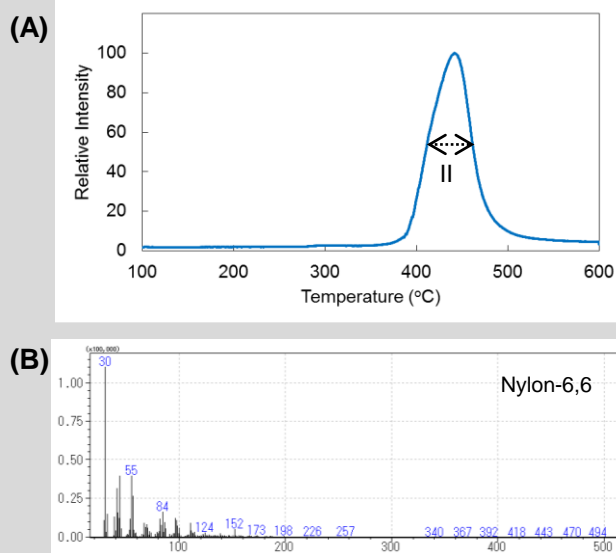


Figure 2. EGA-MS analysis

(A) Thermogram (B) Mass spectrum at zone II