High-sensitivity detection of polystyrene by pyrolysis (Py)-GC/MS using F-Splitless injection method

Part 3 Calibration curves for polystyrene pyrolyzates

[**Background**] In the previous note (PYA1-155E), in the pyrolysis of PS, the peak area ratio of styrene trimer/monomer (SSS/S) obtained by F-Splitless injection method exhibited excellent reproducibilities while suppressing secondary reactions of pyrolyzates. Here, the linearity of calibration curves obtained by both split and F-Splitless injection methods is presented.
[**Experimental**] Using the methods described in the previous note (PYA1-154E), Py-GC/MS measurements of PS were conducted using the split and F-Splitless injection methods. The calibration curves were prepared using the peak areas of characteristic ions of S (*m/z* 104) and SSS (*m/z* 91) in scan mode. In the F-Splitless injection method, in addition to scan mode, measurements were also done in the SIM mode, and calibration curves were constructed.
[**Results**] The calibration curves obtained are shown in Fig. 1. Each calibration curve exhibits a fairly good linearity as indicated by the coefficient of determination (R^2) ranging from 0.994 to 0.999 for the split injection method and the F-Splitless injection method, covering sample amounts from 1 ng to 10 µg and 0.01 to 100 ng, respectively. Notably, in the F-Splitless injection method, both scan and SIM modes demonstrated good linearity in their calibration curves.

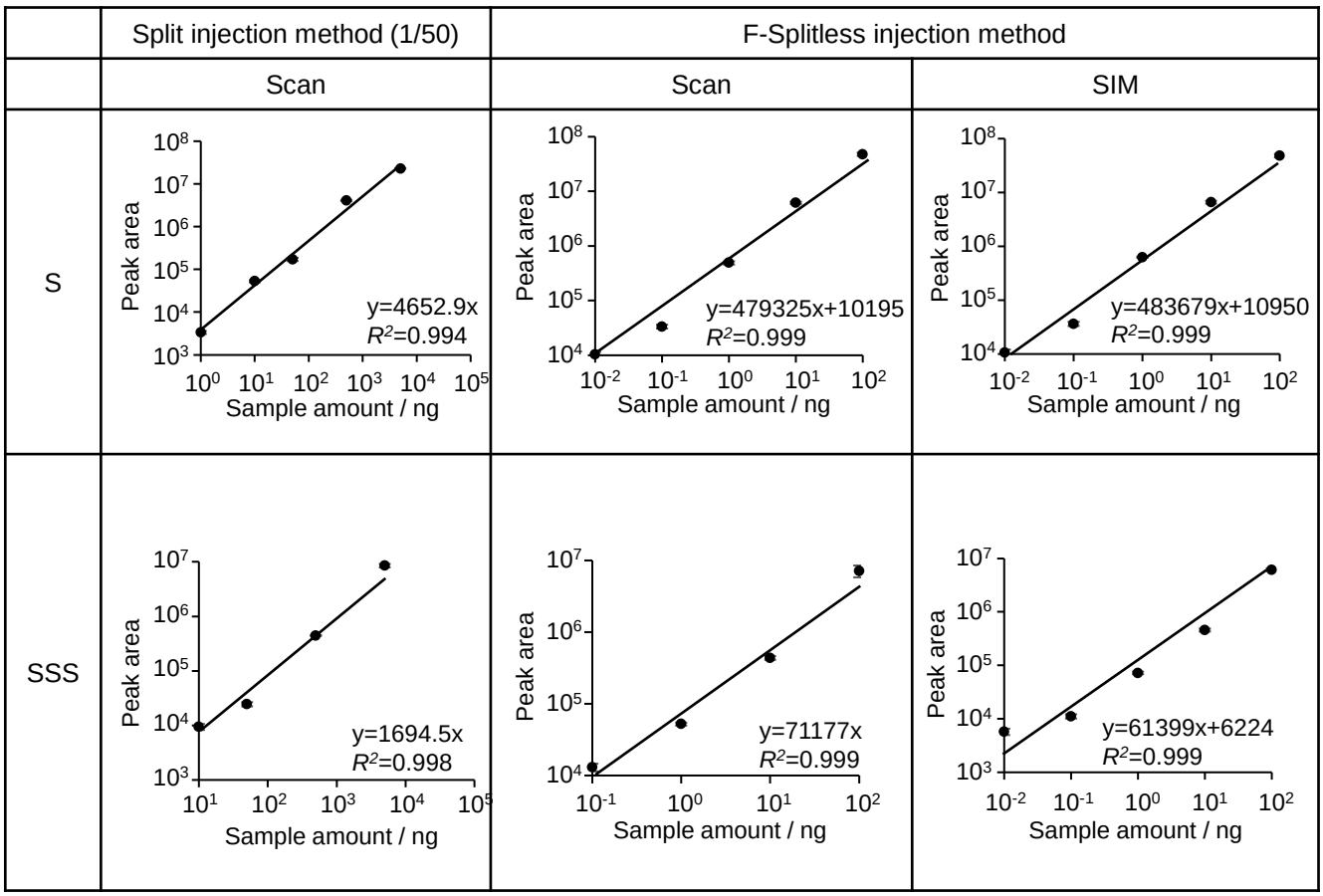

Fig. 1 Calibration curves for S and SSS obtained by Py-GC/MS of PS using split and F-Splitless injection methods.

Reference: K. Tei *et al.*, *J. Anal. Appl. Pyrolysis* 168 (2022) 105707.

Keywords : F-Splitless injection method, Split injection, Secondary reaction, High-sensitivity detection, Microplastics

Products used : Multi-Shot Pyrolyzer, Multi-Functional Splitless Sampler, Auto-Shot Sampler, Eco-Cup LF, Packed GC glass insert, UAMP column kit, Vent-free GC/MS adapter, F-Search MPs 2.1

Applications : Environmental analysis, Trace analysis, General polymer analysis

Related technical notes : PYA1-154E (Part 1), PYA1-155E (Part 2), PYA1-157E (Part 4), PYT-037E, PYT-038E

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