

Preparation and evaluation of calibration standard for microplastic (MP) analysis using SiO₂ as a diluent

Part 3: Calibration curves for polymers in MPs-SiO₂

[Background] In the previous note (PYA1-144E), a pyrogram of the MPs calibration standard (MPs-SiO₂) were reported. In this note, calibration curves for the characteristic pyrolyzates of polymers in the calibration standard are described.

[Experimental] 0.4 mg, 2 mg, and 4 mg of MPs-SiO₂ were placed in an Eco-Cup LF. Measurements were made by the method described previously (PYA1-144E), and the peak areas of the indicator ions (Table 1) in the extracted ion chromatograms were used to create calibration curves for the 11 polymers. The limit of detection (LOD = 3.3 s/a) determined from the slope of the calibration curve (a) and the standard deviation at the lowest concentration (s) is shown in Table 1. The GC was operated in a constant pressure mode (150 kPa) with a split ratio of 1/50. The mass spectrometer was operated in a scan mode.

[Results] The calibration curves so created are shown in Fig. 1. The coefficients of determination R^2 for 10 polymers indicate a good linearity (>0.99) except PET. In the case of PET, use of MPs-CaCO₃, in which CaCO₃ is used as a diluent, is recommended for the quantitative analysis (Technical notes PYA1-146E through 148E).

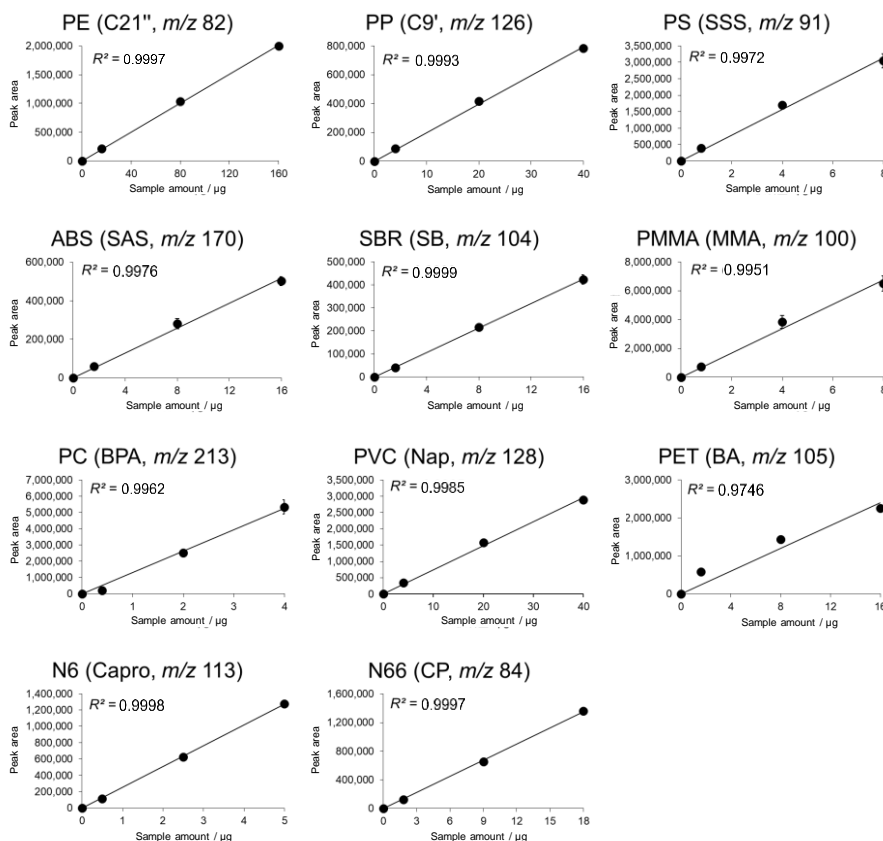


Table 1 Characteristic pyrolyzates and LODs for 11 polymers.

Polymer	Abbrev. of characteristic pyrolyzate*	m/z	LOD [µg]
PE	C21''	82	1.90
PP	C9'	126	0.56
PS	SSS	91	0.11
ABS	SAS	170	0.05
SBR	SB	104	0.15
PMMA	MMA	100	0.03
PC	BPA	213	0.24
PVC	Nap	128	0.38
PET	BA	122	0.94
N6	Capro	113	0.05
N66	CP	84	0.32

* See PYA1-144E for abbreviations.

Fig. 1 Calibration curves for 11 polymers created using MPs-SiO₂.

Keywords : Microplastics, Calibration standard, Reference material, Diluent

Products used : Multi-Shot Pyrolyzer, Multi-Functional Splitless Sampler, Auto-Shot Sampler, MP calibration standard sample set (MPs-SiO₂), Eco-Cup LF, GC glass insert with filler, UAMP column kit, Vent-free GC/MS adapter, F-Search MPs

Applications : Environmental Analysis, Trace analysis, General polymer analysis

Related technical notes : PYA1-143E (Part 1), PYA1-144E (Part 2), PYA1-146E, PYA1-147E, PYA1-148E (MPs-CaCO₃)

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