

Analysis of microplastics using pyrolysis (Py)-GC/MS

Part 2: Identification of colored marine microplastics

[Background] In a previous note ([PYA1-110E](#)), white micro plastic (MP) samples were identified using Py-GC/MS. In this note, Py-GC/MS analysis of colored MP samples is described.

[Experimental] A Py-GC/MS system in which a Multi-Shot Pyrolyzer (EGA/PY-3030D) was directly interfaced to a GC injector was used for measurements. Six different colored MP samples (Sample A: green, Sample B: black, Sample C: yellow, Sample D: red, Sample E: green, and Sample F: blue) collected from the surface water at Osaka Bay were cut into ca. 1 mm squares with a cutting knife. Each piece was placed in an Eco-Cup LF (volume 80 µL) and introduced into the pyrolyzer furnace pre-heated at 600 °C for flash pyrolysis.

[Results] The pyrograms of the six different MP samples obtained by Py-GC/MS are shown in Fig. 1. Through the library search with [F-Search "All-In-One"](#), Sample A was identified as polyethylene, and Samples C to F show almost the same pyrogram and were identified as polypropylene. From FT-IR measurements, Sample B was identified as ethylene propylene rubber based on the library search. However, Sample B shows peaks ascribed to isoprene, styrene, and butadiene in its pyrogram (Fig. 1), suggesting that Sample B will be a rubber composed of natural rubber (or isoprene rubber) and styrene-butadiene rubber.

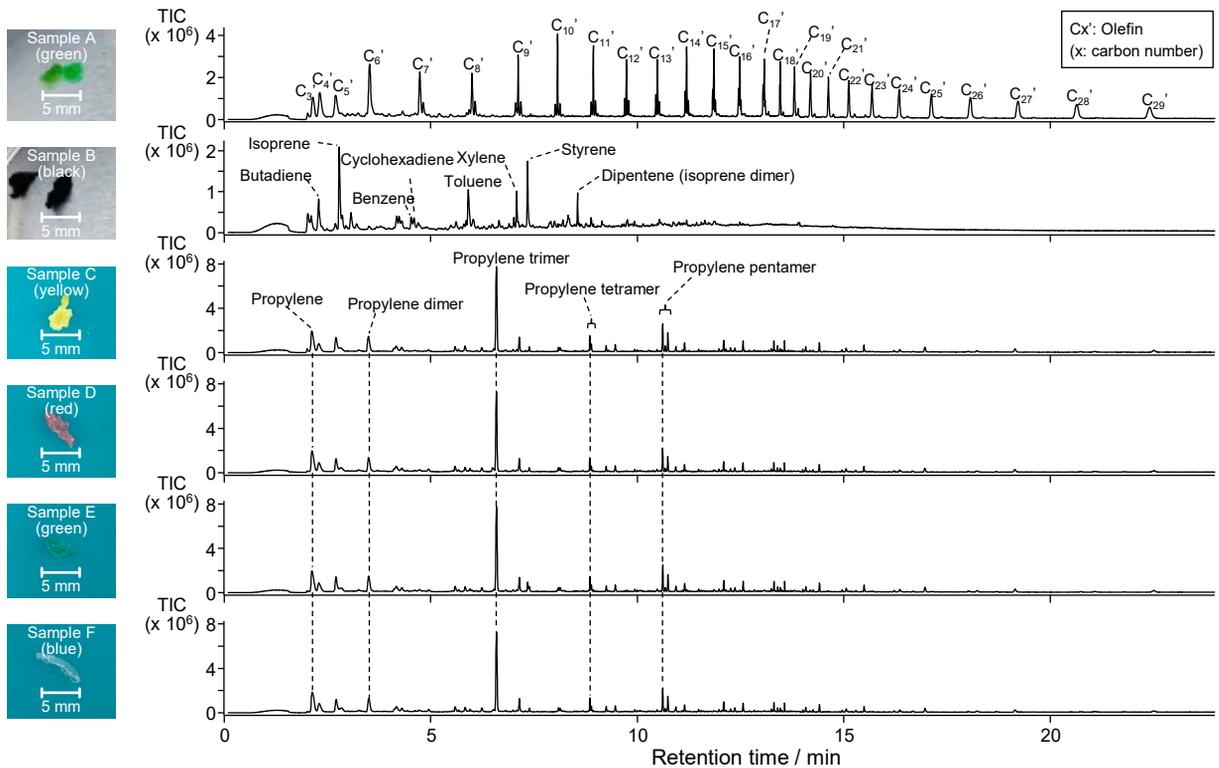


Fig. 1 Pyrograms of MP samples

Pyrolysis temp.: 600 °C, GC inj. temp.: 300 °C, GC oven temp.: 40 (2 min hold) - 320 °C (20 °C/min, 16 min hold), Split ratio: 1/16
 Separation column: UA⁺-5 (5 % diphenyl 95 % dimethylpolysiloxane), L=30 m, id=0.25 mm, df=0.5 µm, Column flow rate: 1 mL/min (He)
 Scan range: m/z 29 - 350, Scan rate: 4 scan/s
 Sample amount: Sample A 102 µg, Sample B 62 µg, Sample C 36 µg, Sample D 37 µg, Sample E 39 µg, Sample F 34 µg

All samples courtesy of Prof. S. Tanaka of Kyoto University

Keywords : Pyrolysis-GC/MS, Microplastics

Products used : Multi-Shot Pyrolyzer, Auto-Shot Sampler, UA⁺-5, Eco-Cup LF, F-Search, Vent-free GC/MS adapter

Applications : Environmental, Microplastics

Related technical notes : [PYA1-110E \(Part 1\)](#)

Please forward your inquiries via our web page or send us a fax message.

R&D and manufactured by :
Frontier Laboratories Ltd.

Phone: (81)24-935-5100 Fax: (81)24-935-5102
<http://www.frontier-lab.com/>