

Analysis of biomass plastic bags

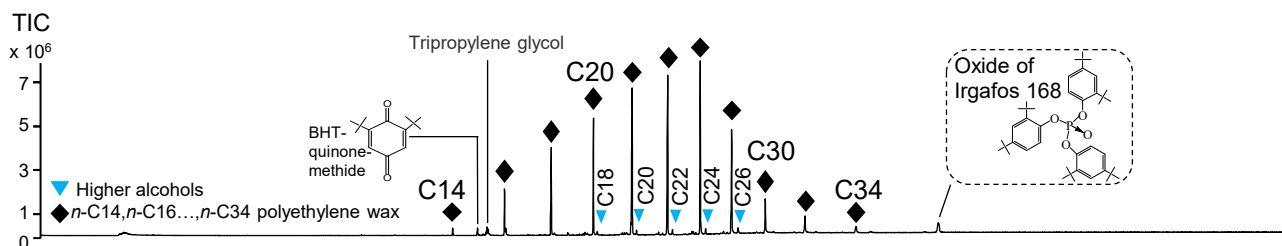
Part 3: Thermal desorption (TD)-GC/MS

[Background] In the previous notes Part 1 ([PYA3-028E](#)) and Part 2 ([PYA1-119E](#)), the analysis of two types of biomass plastic bags was performed using evolved gas analysis (EGA)-MS and pyrolysis (Py)-GC/MS, respectively. In this note, the qualitative and quantitative analysis of additives in both plastic bags were performed using thermal desorption (TD)-GC/MS.

[Experimental] A Py-GC/MS system with a Multi-Shot Pyrolyzer (EGA/PY-3030D) directly interfaced to the GC injector was used for measurements. The unprinted part of each of two types of plastic bags was cut out using a cutting knife and placed in an Eco-Cup LF and then was loaded into the pyrolyzer furnace for thermal desorption analysis. Volatile components released from the sample were cryo-trapped at the head of a separation column using MicroJet Cryo-Trap (MJT-1035Ex), and then were analyzed by GC/MS to obtain TD chromatograms upon turning off the Cryo-Trap. The standard addition method was used for the quantification of volatile antioxidants.

[Results] The TD chromatograms of Biomass plastic bags are shown in Fig. 1. Both samples were found to contain a variety of additives. The concentrations of antioxidant Irgafos 168 in Biomass plastic bags A and B were determined to be 450 ppm and 95 ppm, respectively. Several pyrolyzates derived from polysaccharides are observed in Fig 1 (B) and are considered deriving from the Rice Resin as noted on Biomass plastic bag B described in Part 1 ([PYA3-028E](#)).

(A) Biomass plastic bag A



(B) Biomass plastic bag B

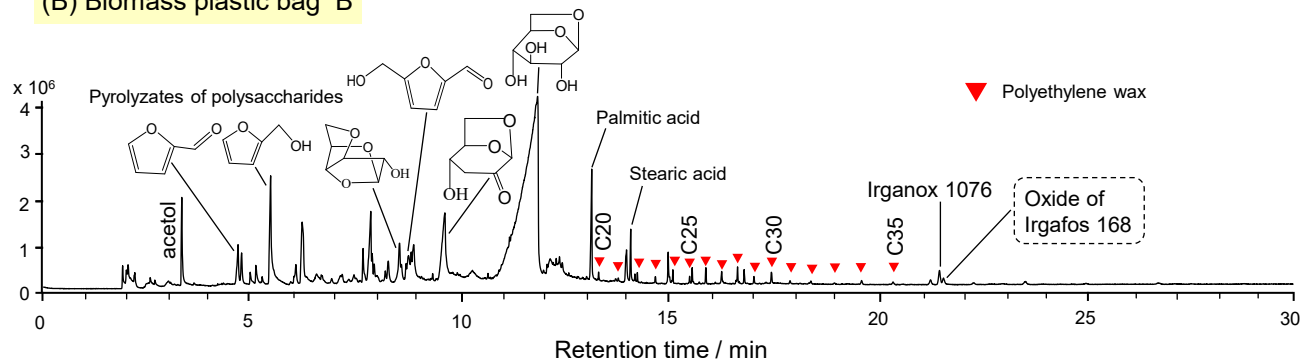


Fig. 1 TD chromatograms of Biomass plastic bag A and Biomass plastic bag B

Furnace temp.: Biomass plastic bag A 100 - 360 °C (40 °C/min); Biomass plastic bag B 100 - 380 °C (40 °C/min)
 GC inj. temp.: 300°C, GC oven temp.: 40 (2 min hold) - 320°C (20 °C/min), Split ratio: 1/10
 Separation column: UA⁺-5 (5 % diphenyl 95 % dimethylpolysiloxane), L=30 m, i.d.=0.25 mm, df=0.25 μm
 Column flow rate: 1.0 mL/min (He), MS scan range: m/z 29 - 600, Sample amount: 1 mg

Keywords : Py-GC/MS, Biomass plastic, Plastic bag

Products used : Multi-functional pyrolyzer, Eco-Cup LF, UA⁺-5 , Vent-free GC/MS adapter, F-Search, MicroJet Cryo-Trap

Applications : Bioplastics, General polymer analysis

Related technical notes : [PYA3-028E](#), [PYA1-119E](#)

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