Analysis of odor components in recycled resin pellets using Magic Chemisorber® Part 2: Analysis with a polar separation column

[Background] In the previous paper (MCA-020E), the odor components of a recycled polypropylene (PP) pellet were collected by the headspace method using Magic Chemisorbers (MC, non-polar MC-S500 and polar MC-PEG-S) and analyzed by GC/MS using a separation column with low polarity. Reported in this note is the analysis of the odor components of the recycled PP pellet, that were collected by the same method, using a polar separation column.

[Experimental] A recycled PP pellet was cut into small pieces, ca. 3 mm in size, and 100 mg of the pieces was placed in a headspace vial (16.8 mL). The MCs were then attached to the end of an Eco-Stick GD and hung in the headspace of the vial which was heated in an oven at 60 ºC for 30 min. The MCs were then thermally desorbed in the pyrolyzer furnace which was temperature programmed from 100 to 230 ºC (1 min hold) with a ramp rate of 20 ºC/min. The thermally desorbed components were cryo-trapped at the head of a separation column by MicroJet Cryo-Trap and then subjected to GC/MS analysis using a polar separation column UA-CW.

[Results] The chromatograms of the thermally desorbed gases from the two types of MCs are shown in Fig. 1. The identifications of major peaks are summarized in Table 1. As in the previous report, limonene was detected mostly by the non-polar MC. On the other hand, more polar compounds including odor components were detected by the polar MC than by the non-polar MC. In conclusion, solid-phase extraction both with non-polar and polar MCs and thermal desorption GC/MS using a pyrolyzer allowed the detection of both non-polar and polar odor components from recycled PP pellets.

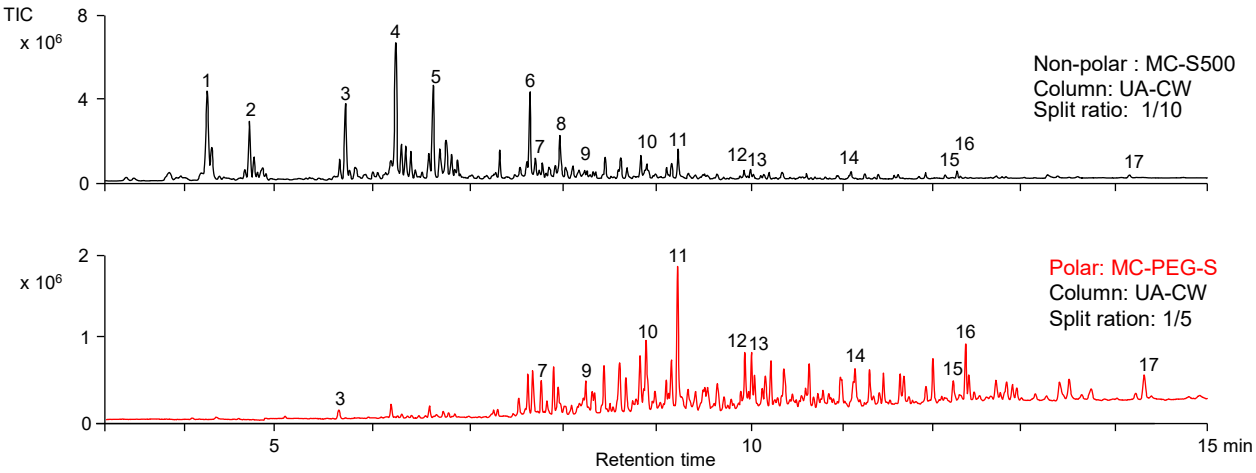

Fig. 1 Chromatograms of gases released from recycled PP pellet upon head-space extraction by Magic Chemisorbers
Sampling: Head space sampling at 60 ºC or 30 min,
Separation column: UA-CW (polyethylene glycol, *L*=30 m, i.d.=0.25 mm, df=0.25 µm),
Column flow rate: 1 mL/min, GC oven temp.: 40 (2 min hold) – 230 ºC (20 ºC/min, 8.5 min hold)

Table 1 Gases released from recycled PP pellet when head-spaced extracted by non-polar and polar Magic Chemisorbers (* odor components used as raw materials for fragrances)

#	Compound	#	Compound	#	Compound
1	Isomer of $C_{12}H_{26}$	7	Dihydromyrcenol*	13	Hexanoic acid*
2	Isomer of $C_{12}H_{26}$	8	Isomer of $C_{18}H_{38}$	14	Decanoic acid*
3	Limonene*	9	Linalool*	15	Octanoic acid*
4	Isomer of $C_{15}H_{32}$	10	L-menthol*	16	2,4-Di-tertbutylphenol
5	Isomer of $C_{15}H_{32}$	11	α-Terpineol*	17	Chloroxylenol
6	Isomer of $C_{18}H_{38}$	12	Anethole*		

Keywords : Recycled resin, Evolved gas analysis, Odor analysis, Solid-phase extraction device, Thermal desorption GC/MS

Products used : Multi-functional pyrolyzer, Magic Chemisorber MCS-500, Magic Chemisorber MC-PEG-S, MicroJet Cryo-Trap, UA+-5, Vent-free GC/MS adapter

Applications : Various industries, General polymer analysis; Odor, Flavor and Fragrance analysis

Related technical notes : MCA-003E, MCA-015E, MCA-020E

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Frontier Laboratories Ltd.
Phone: (81)24-935-5100 Fax: (81)24-935-5102
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