

# Analysis of odor components in recycled resin pellets using Magic Chemisorber® Part 1: Analysis with a low-polar separation column

**[Background]** Waste and/or scrap resins are reused as recycled pellets, but the presence of odor in the recycled pellets impacts the product quality. In this report, the odor components from a polypropylene (PP) pellet which was recycled from wax and detergent containers are extracted by solid-phase extraction devices, Magic Chemisorbers (MC, non-polar MC-S500 and polar MC-PEG-S), and the headspace-extracted odor components are analyzed by thermal desorption GC/MS using a separation column with low polarity.

**[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 MC was 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 °C for 30 min. The MC was then thermally desorbed in the pyrolyzer furnace which was temperature programmed from 100 to 230 °C (1 min hold) with a ramp rate of 20 °C/min. The thermally desorbed components were cryo-trapped by a MicroJet Cryo-Trap at the head of a separation column, then subjected to GC/MS analysis using a low-polar separation column UA<sup>+</sup>-5.

**[Results]** Fig. 1 shows the chromatograms of the gas components extracted by the MCs. Table 1 shows the qualitative results of major peaks. Limonene, a typical citrus odor component, was detected in a large quantity by the non-polar MC. On the other hand, with the polar MC, many polar compounds such as alcohols and carboxylic acids containing trace amounts of odor components not detected by the non-polar MC were detected. These results indicate that in thermal desorption GC/MS using a separation column with low polarity, non-polar and polar components are detected by the non-polar and polar MCs, respectively, allowing for a simple and convenient analysis tool to analyze odor components.

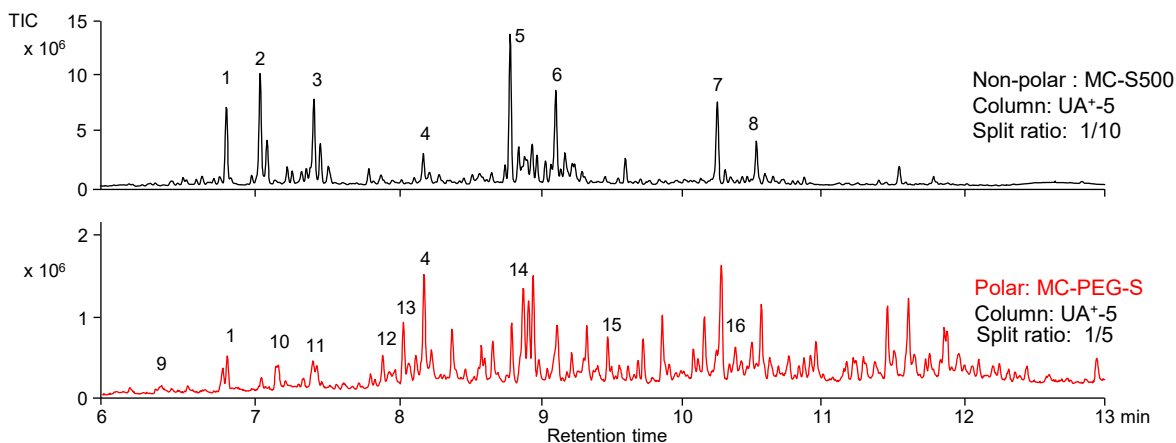


Fig. 1 Chromatograms of gases released from recycled PP pellet upon head-space extraction by Magic Chemisorbers

Sampling: Head space sampling at 60 °C or 30 min,  
 Separation column: UA<sup>+</sup>-5 (5 % diphenyl 95 % dimethylpolysiloxane, 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 °C (20 °C/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	Limonene*	7	Isomer of C <sub>18</sub> H <sub>38</sub>	13	L-menthol*
2	Isomer of C <sub>12</sub> H <sub>26</sub>	8	Isomer of C <sub>18</sub> H <sub>38</sub>	14	Anethole*
3	Isomer of C <sub>12</sub> H <sub>26</sub>	9	Hexanoic acid*	15	Chloroxylenol
4	α-Terpineol*	10	Dihydromyrcenol*	16	2,4-Di-tertbutylphenol
5	Isomer of C <sub>15</sub> H <sub>32</sub>	11	Linalool*		
6	Isomer of C <sub>15</sub> H <sub>32</sub>	12	Octanoic acid*		

**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<sup>+</sup>-5, Vent-free GC/MS adapter

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

**Related technical notes :** [MCA-003E](#), [MCA-015E](#)

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