

Flavor components analysis using non-polar and polar Magic Chemisorber®

5. Headspace analysis of instant coffee

[Background] Headspace solid phase extraction (HS-SPE) using non-polar Magic Chemisorber® MC-S500 and polar Magic Chemisorber® MC-PEG-S is described for the analysis of flavor components in instant coffee.

[Experimental] A non-polar Magic Chemisorber® MC-S500 (film thickness of PDMS: 500 µm) was attached to an Eco-Stick DF and held in the headspace of a 17 mL vial containing 0.20 g of commercially obtained instant coffee at 80 °C for 10 min. The Magic Chemisorber® was then set in the pyrolyzer furnace and heated: 100 - 230 °C (3 min hold). Thermally desorbed compounds were swept by the helium carrier gas to a GC separation column (UA-WAX) and cryo-trapped at the head of the separation column using a MicroJet Cryo-Trap. Then, the trap was tuned off, and the released volatiles were separated and detected by a quadrupole mass detector. For comparison, the analysis was similarly performed using the polar Magic Chemisorber® MC-PEG.

[Results] Chromatograms of the extracted flavor compounds from instant coffee are shown in Fig. 1, and peak assignments are summarized in Table 1. Non-polar Magic Chemisorber® extracted pyridine, acetic acid, furfuryl alcohol, maltol, caffeine, etc. On the other hand, many similar flavor components were extracted with polar Magic Chemisorber®. As described above, it was demonstrated that flavor components in instant coffee can be easily and quickly analyzed using solid-phase extraction with Magic Chemisorber®, followed by thermal desorption GC/MS with a pyrolyzer.

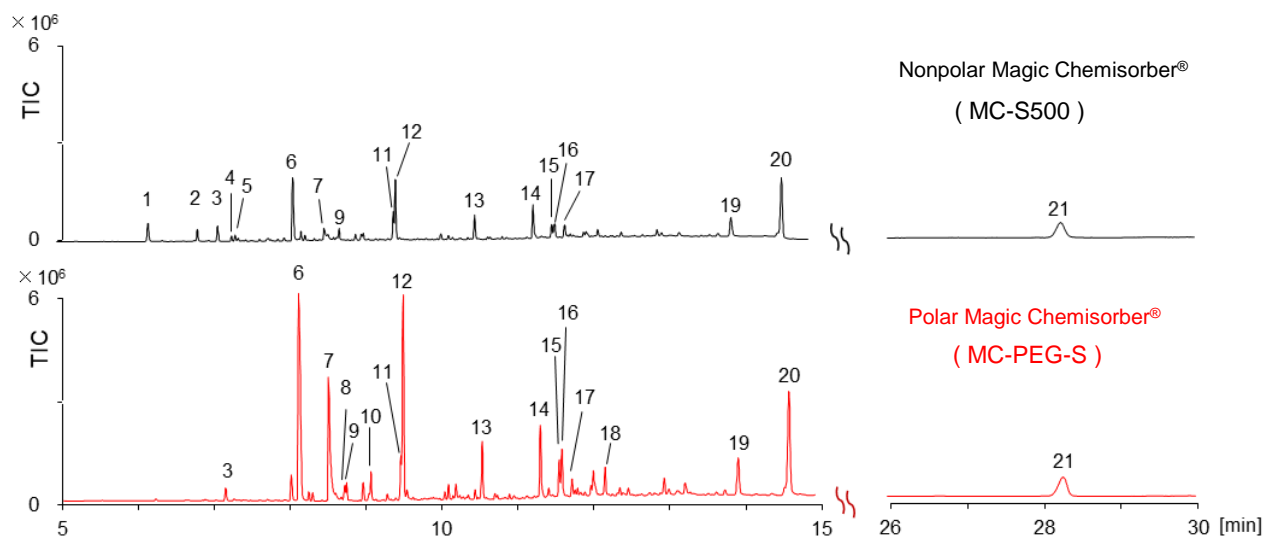


Fig. 1 Chromatogram of flavor components extracted from instant coffee by polar and nonpolar Magic Chemisorber®

Sample amount: 0.20 g, Headspace extraction: 10 min at 80 °C Thermal desorption temp.: 100 - 230 °C (40 °C/min, 3 min hold), Cryo-trapped with MicroJet Cryo-Trap, Separation column: Ultra ALLOY-WAX (polyethylene glycol), L = 30 m, i.d. = 0.25 mm, df = 0.25 µm Column flow rate: 1 mL/min, Split ratio: 1/10, GC oven temp.: 40 °C (2 min hold) - 230 °C (20 °C/min, 8.5 min hold)

Table 1 Flavor compounds extracted from instant coffee

#	Compound	#	Compound	#	Compound
1	Pyridine	8	Propanoic acid	15	Furyl hydroxymethyl ketone
2	Methylpyrazine	9	Furfuryl Acetate	16	1H-Pyrrole-2-carboxaldehyde
3	1-Hydroxy-2-propanone	10	Propylene Glycol	17	2-Pyrrolidinone
4	2,5-Dimethyl-Pyrazine	11	Butyrolactone	18	1,3-Cyclopentanedione
5	2,6-Dimethyl-Pyrazine	12	Furfuryl alcohol	19	3-Pyridinol
6	Acetic acid	13	3-Methyl-1,2-cyclopentanedione	20	5-Hydroxymethylfurfural
7	Oxalic acid	14	Maltol	21	Caffeine

Keywords : Evolved gas analysis, Solid-phase extraction device, Thermal desorption GC/MS , Instant coffee

Products used : Multi-functional pyrolyzer, Magic Chemisorber® MC-S500, Magic Chemisorber® MC-PEG, Flow Through EcoCup LHF, MicroJet Cryo-Trap, UA-WAX

Applications : Foods, Flavors analysis

Related technical notes : [MCA-014E](#), [MCA-015E](#)

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