Solid phase extraction using new Polar Magic Chemisorber®

4. Headspace analysis of fermented soybeans (*natto*) flavor components

[Background] Headspace method based on solid phase extraction (SPE) using a new Magic Chemisorber® MC-PEG is described for the analysis of flavor components in fermented soybeans (*natto*).

[Experimental] A Polar Magic Chemisorber® MC-PEG (film thickness of PEG: 30 µm, volume: 3.8 µL) was placed onto an Eco-Stick GD and was held in the headspace of a 13.5 mL vial, which contained 2.0 g of fermented soybeans for 30 min at 40 ºC. The Magic Chemisorber® was then positioned in the pyrolyzer furnace and heated: 100 - 230 ºC (3 min hold). Thermally desorbed compounds were swept by the helium carrier gas to the GC injection port. The desorbed compounds were cryo-trapped at the head of the separation column (UA-CW) using a MicroJet Cryo-Trap. Then, the trap was heated, and the trapped volatiles were separated on the separation column and detected by a quadrupole mass detector. For comparison, the analysis was similarly performed using the nonpolar Magic Chemisorber® MC-S500.

[Results] Chromatograms of the extracted compounds from the fermented soybeans are shown in Fig. 1, and peak assignments are summarized in Table 1. Various polar components, acetoin and isovaleric acid were observed in the chromatogram. The results show that the use of the Magic Chemisorber® MC-PEG and the pyrolyzer configured for thermal desorption is a quick and simple technique for analyzing polar components in solid samples.

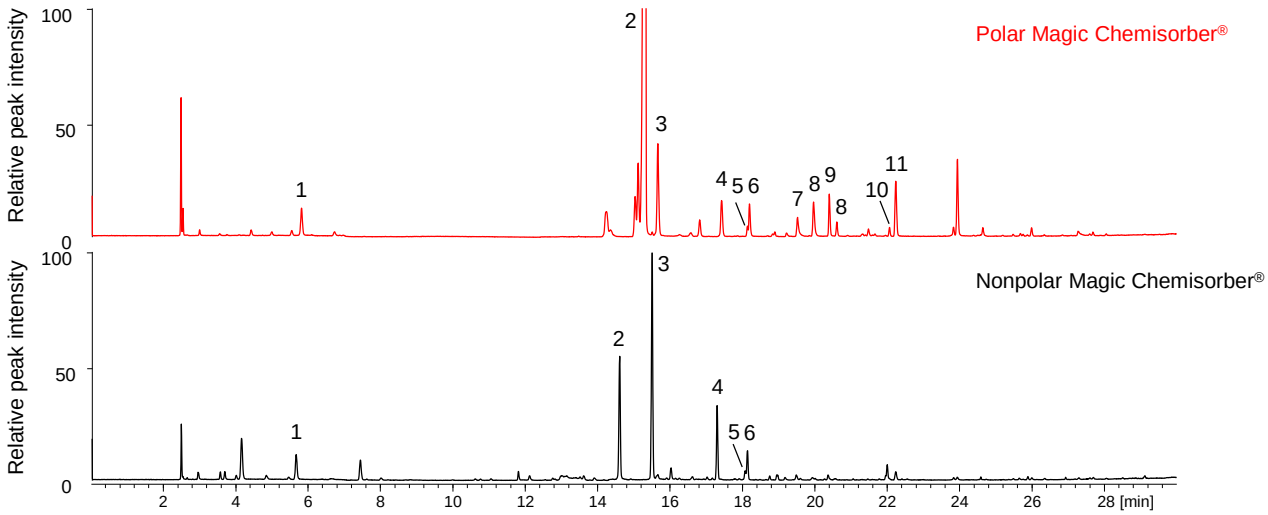

Fig. 1 Chromatograms of extracted compounds from fermented soybeans by polar and nonpolar Magic Chemisorber®

Sample amount: 2.0 g of fermented soybeans, headspace extraction: 30 min at 40 ºC
Thermal desorption temp.: 100 - 230 ºC (40 ºC/min, 3 min hold), cryo-trapped with MicroJet Cryo-Trap
Separation column: Ultra ALLOY-CW (polyethylene glycol), *L* = 30 m, i.d. = 0.25 mm, df = 0.25 µm
Column flow rate: 1 mL/min, Split ratio: 1/5, GC oven temp.: 40 ºC (3 min hold) - 250 ºC (10 ºC/min, 4 min hold)

Table 1 Compounds extracted from fermented soybeans (compounds extracted only by polar Magic Chemisorber® are shown in red)

#	Compound	#	Compound
1	Ethanol	9	Isobutyric acid
2	Acetoin	10	Furfuryl alcohol
3	2,5-Dimethylpyrazine	11	Isovaleric acid
4	Trimethylpyrazine		+ 2-Methylbutyric acid
5	2-Ethyl-3,6-dimethylpyrazine		
6	Acetic acid		
7	2-Hydroxyisobutyric acid		
8	2,3-Butanediol		

Keywords : Solid phase extraction, Polar sorbent, PEG, Headspace method, TD-GC/MS, Fermented soybeans (*natto*)

Products used : Multi-functional pyrolyzer, Magic Chemisorber® MC-PEG, MicroJet Cryo-Trap, UA-CW, Eco-Stick GD

Applications : Foods, flavors analysis

Related technical notes : MCA-011E, MCA-003E

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