

Solid phase extraction using new Polar Magic Chemisorber®

2. Flavor components in soy sauce

[Background] Compounds in soy sauce were extracted by a new Magic Chemisorber® MC-PEG and were subsequently thermally desorbed, separated using gas chromatography and detected by a mass spectrometer (MS).

[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 immersed in 5.0 mL of soy sauce for 30 min at 25 °C. After 30 min, the Magic Chemisorber® was briefly rinsed with distilled water and wiped with a clean paper tissue. The Magic Chemisorber® was positioned in the pyrolyzer furnace and heated: 100 - 230 °C (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 soy sauce are shown in Fig. 1, and peak assignments are summarized in Table 1. Various polar components, including glycerol and 4-vinylguaiaicol 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 liquid samples.

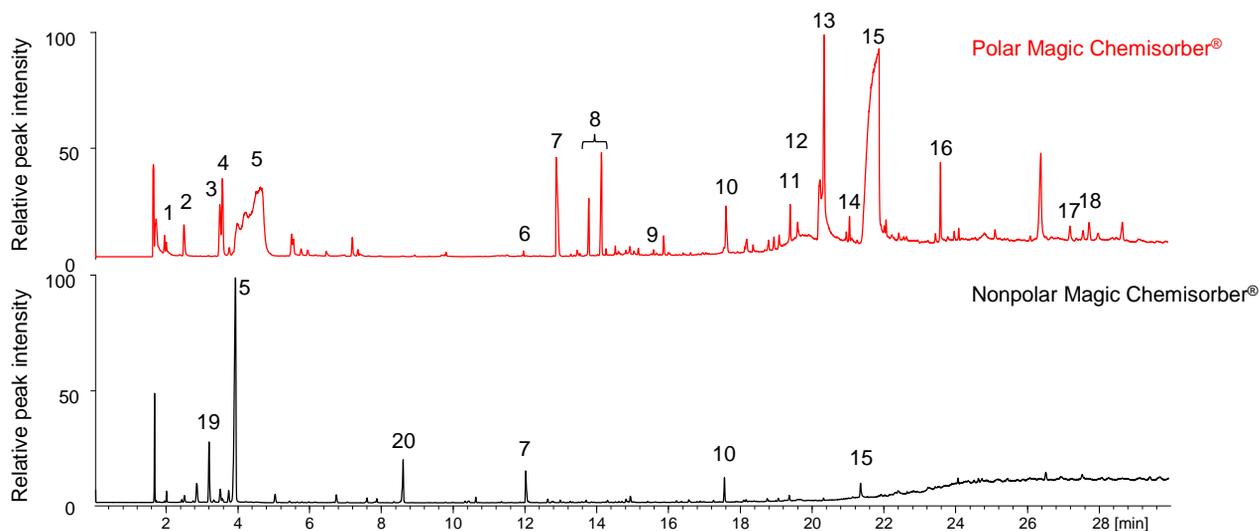


Fig. 1 Chromatograms of extracted compounds (immersion method) from soy sauce by polar and nonpolar Magic Chemisorber®

Sample amount: 5.0 mL, Extraction: 30 min immersion at 25 °C (stirring speed 600 rpm)
 Thermal desorption temp.: 100 - 230 °C (40 °C/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 °C (3 min hold) - 250 °C (10 °C/min, 14 min hold)

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

#	Compound	#	Compound	#	Compound
1	Methyl mercaptan	9	Methionol	15	Glycerol
2	Isobutylaldehyde	10	Phenethyl alcohol	16	4-Vinylsyringol
3	2-Methylbutanal	11	2-Ethyl-4-hydroxy-5-methyl furanone (HEMF)	17	2-Methoxyhydroquinone
4	Isovaleraldehyde	12	Lactic acid	18	p-Hydroxyphenethyl alcohol (Tyrosol)
5	Ethanol	13	4-Vinylguaiaicol	19	Ethyl acetate
6	Acetol	14	2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one	20	Isoamyl alcohol
7	Acetic acid				
8	2,3-Butanediol				

Keywords : Solid phase extraction, Polar sorbent, PEG, Immersion method, Thermal desorption GC/MS, Soy sauce

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

Applications : Food and flavor component analysis

Related technical notes : [MCA-011E](#)

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Frontier Laboratories Ltd.

Phone: (81)24-935-5100 Fax: (81)24-935-5102
<http://www.frontier-lab.com/>