

Solid phase extraction of smoke components from peat combustion by Magic Chemisorber PDMS and thermal desorption-GC/MS analysis

[Background] Whisky production involves the drying of malt by peat combustion and smoking, which adds characteristic flavor to the whisky. In this report, the smoke components from peat combustion were extracted to the Magic Chemisorber PDMS, and their qualitative analysis was done by thermal desorption-GC/MS.

[Experimental] The Magic Chemisorber PDMS S500 (PDMS film thickness 500 µm, MC-S500) was hanged in the headspace of a 20 mL glass vial containing a peat sample (from Islay, UK, 2.5 mg), and the vial was sealed with a cap. After heating the bottom of the capped vial with a burner for ca.1 min to burn the peat sample, the vial was left at 20 °C for 10 min. The MC-S500 containing the extracted smoke components was then placed in a Flow Through Eco-Cup LHF, and thermal desorption was carried out using a pyrolyzer (EGA/PY-3030D) connected directly to the GC/MS inlet. The components volatilized by thermal desorption (100-250 °C, 50 °C/min) were cryo-trapped at the head of a separation column using a MicroJet Cryo-Trap, followed by GC/MS analysis.

[Results] Fig. 1 shows a chromatogram of the smoke components produced by the peat combustion. The peak assignments of the major peaks are summarized in Table 1. The peaks of furfurals (**3**, **4**) and levoglucosenone (**8**), which are pyrolyzates of polysaccharides such as cellulose, were detected with high intensity. On the other hand, many peaks of phenolic compounds, which are the source of whisky's characteristic flavor, were also detected. In summary, qualitative analysis of the smoke components produced during the peat combustion could be easily done by solid-phase extraction using a MC-S500 and thermal desorption GC/MS analysis.

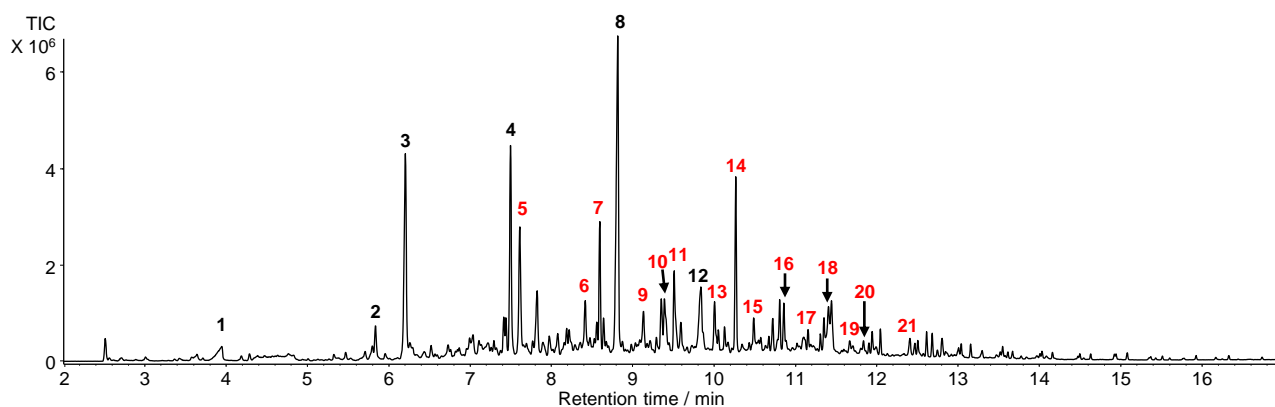


Fig. 1 Chromatogram of the smoke components produced during peat combustion

Sample amount: 2.5 mg,
 Extraction condition: MC-S500 hanging in the headspace of a 20 mL glass vial, extraction at 20 °C for 10 min
 Thermal desorption temp.: 100 – 250 °C (50 °C/min, 3 min hold), cryo-trapped with MicroJet Cryo-Trap
 Column: UA⁺-5 (5 %diphenyl - 95 % dimethylpolysiloxane), L=30 m, i.d.=0.25 mm, df=0.25 µm, column flow rate: 1 mL/min,
 Split ratio: 1/5, GC oven: 40 °C (3 min hold) – 250 °C (10 °C/min, 4 min hold)

Table 1 Smoke components produced during peat combustion (Phenolic compounds)

#	Compounds	#	Compounds	#	Compounds
1	Acetic acid	8	Levoglucosenone	15	Syringol
2	2-Furanone	9	Ethylphenol	16	Vanillin
3	Furfural	10	Creosol	17	Isoeugenol
4	5-Methyl furfural	11	4-Vinylphenol	18	Apocynin
5	Phenol	12	Nonanoic acid	19	Guaiacylacetone
6	Cresol	13	4-Ethylguaicol	20	4-Vinylsyringol
7	Guaicol	14	4-Vinylguaicol	21	Syringaldehyde

Keywords : Peat, Whisky, Solid phase extraction, Thermal desorption (TD)-GC/MS

Products used : Multi-Shot Pyrolyzer, Magic Chemisorber PDMS S500, MicroJet Cryo-Trap, UA⁺-5, Flow Through Eco-Cup LHF, Vent-free GC/MS Adapter

Applications : Food analysis, Flavor analysis, Forensic science

Related technical notes : [MCA-001E](#)

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