

Quantitation of the alkaloids berberine, palmatine and jatrorrhizine in Mahonia stem by capillary electrophoresis

Application Note

Pharmaceutical

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Abstract

Many species of the Mahonia plant are used in China as traditional medicines. Some of the active components have been identified as alkaloids and pharmacological research has determined that the plant has antibacterial, antioxidant, antifungal, anticancer and antiproliferative properties. Here we describe the quantitation of three alkaloids in the stem of various mahonia species. CE is particularly suited to the analysis of plant extracts because of its ability to deal with complex or “dirty” sample matrices. Unlike HPLC where the complexity of the sample matrix can affect the column packing, CE operates in an open capillary tube and simple flushing between analyses is sufficient to remove residual matrix components.



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Experimental

All experiments were performed using an Agilent Capillary Electrophoresis system controlled via PC with the Agilent ChemStation software. Fused silica capillaries were also supplied by Agilent Technologies. Mahonia samples and standards were the kind gift of Prof H. Liu, Peking University, P.R. China.

Experimental

2 g each of pulverized Mahonia stem were ultrasonicated in 10 mL methanol for 30 minutes. This was repeated twice using 5 mL methanol and ultrasonicated for 20 minutes. The combined extracts were centrifuged for 10 minutes (4000 rpm) and filtered through 0.45 μm membrane before injection.

CE conditions: Samples were analysed using capillary zone electrophoresis according to the method of Li *et al* with the conditions listed beside.

Prior to each run the 50- μm capillary (48.5 cm, 40 cm effective) was flushed 2 minutes with 0.1 M NaOH, 2 minutes with water and 5 minutes with buffer. Replenishment of buffer vials were performed every six runs to achieve best reproducibility.

Results

A typical separation of a Mahonia stem is shown in figure 1. Detection at 265 nm confers some selectivity on the analysis and the three alkaloids berberine, palmatine and jatrorrhizine

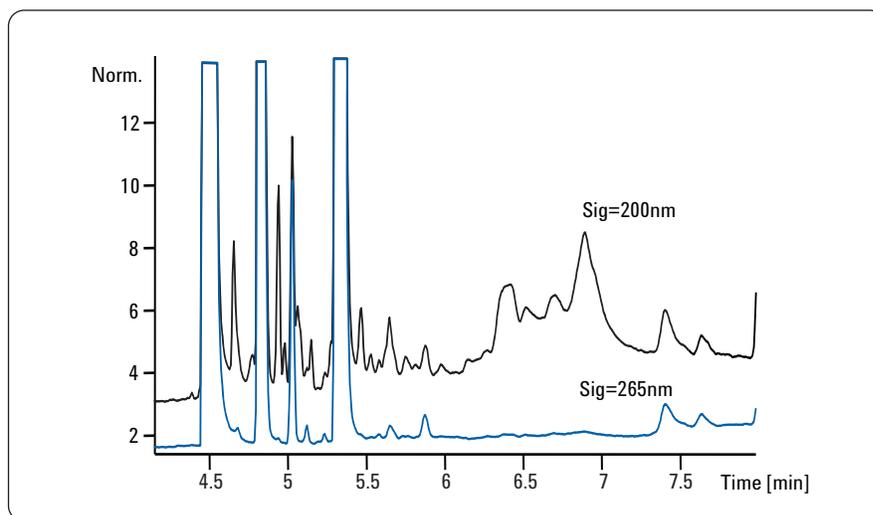


Figure 1
Separation of alkaloids of *Mahonia japonica* by CZE.

Chromatographic conditions

Injection: 10 sec @ 50 mbar
Capillary: L = 48.5 cm, l = 40 cm, 50 μm id
Buffer: 50 mM phosphate, 50 mM borate containing 50 % methanol
with apparent pH adjusted to pH 8
Voltage: 30 kV
Temperature: 20°C

are well separated from other sample matrix components which absorb at that wavelength. Detection at 200 nm illustrates the complexity of the sample matrix. Detection of berberine, palmatine and jatrorrhizine were linear over the ranges 3.4–109 mg/mL, 1.4–44 mg/mL and 1.1–37 mg/nL respectively with r^2 better than 0.999 in all cases.

Reference

1. Li, Y., Ji, X., Liu, H., Yan, Y., Li, Characterization of Ten Species of Mahonia by Capillary Electrophoresis, *J. Chromatographia*, 51, 357-361, 2000.

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