

Determination of monosodium glutamate in instant noodles by capillary electrophoresis.

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Abstract

In this work, a simple method was used to determine monosodium glutamate in noodles by capillary electrophoresis with capacitively coupled contactless conductivity detection.

Key words: Amino acids, food safety, food analysis

Introduction

Monosodium glutamate (MSG) is the sodium salt of the glutamic acid. Glutamic acid is a non-essential amino acid used as a flavor enhancer in foodstuffs and it is considered safe to be used as food additive.¹ Capillary electrophoresis is a powerful separation technique based on the differences on the electrophoretic mobility of ions when submitted to the action of an electric field. The determination of amino acids using capillary electrophoresis is usually done through derivatization steps, which are laborious, expensive and troublesome.² In this work a simple method¹ was applied to determine MSG in instant noodles by capillary electrophoresis with capacitively coupled contactless conductivity detection. (CE-C⁴D).

Results and Discussion

CE separation of the MSG was conducted in a home-made CE-C⁴D system³, operating at 625 kHz and 2 V_{pp} (peak-to-peak) sinusoidal signal. CE separations were conducted at room temperature (20-25°C). A bare fused-silica capillary with 50 cm total length (42 cm effective) and 50 μm internal diameter was used. The background electrolyte (BGE) was composed by 5 mol L⁻¹ acetic acid. Separation voltage was 20 kV. Samples were hydrodynamically injected at 11 kPa for 10 s.

MSG was extracted from 0.1000 g of sauce samples, using 10 mL of deionized water, under sonication during 10 min, the supernatant liquid was filtered through a poly(vinilidene fluoride)(PVDF) membrane filter (0.22 μm) and acetonitrile (50% v/v) was added in all standard solutions and samples to avoid peak splitting.¹

Glycine 40 mg L⁻¹ was used as an internal standard once this compound was not found in the samples and do not co-migrate with the analyte. CE separations were achieved in less than 10 min (Figure 1) with enough resolution and without matrix interferences. Calibration curve was obtained by injecting five working standard solutions ranging from 50 to 280 mg L⁻¹ and presented correlation coefficients (R²) of 0.995. The limit of quantification (LOQ) was 3.77 mg L⁻¹. Table 1 depicts some analytical parameters that were evaluated in this work.

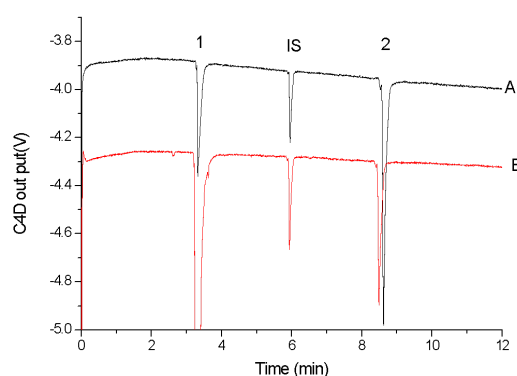


Figure 1. Electropherograms of (A) standard solutions of the MSG and (B) extracts of the sauce noodles (B). BGE: 5 mol L⁻¹ acetic acid. Capillary: 50 μm, 50 cm total length (42 cm effective). Separation voltage of 20 kV; hydrodynamic injection at 11 kPa for 10 s. C⁴D detection operating at 625 kHz. Peaks: (IS) glycine, (1) sodium, (2) glutamate.

Table 1. Analytical parameters of the CE-C⁴D method.

Intercept	0.138
Slope	0.011
R ²	0.997
LOD (mg L ⁻¹)	1.14
LOQ (mg L ⁻¹)	3.77

By using this method, concentrations of 0.77 mg g⁻¹ of glutamate was determined in commercial samples of sauce noodles.

Conclusions

The CE-C⁴D method demonstrated to be simple, and reliable for determination of MSG in instant noodles.

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¹ Campos, C. D. M., Braga, P. A. de C., Reyes, F. G. R., da Silva, J. A. F., J. Sep. Sci. **2015**, 38, 3781.

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³ Da Silva, J.A.F., Do Lago, C.L.. Anal. Chem.. **1998**, 70, 4339.