Simultaneous Determination of Seven Carbamate Pesticide Residues in Vegetable by Capillary Electrophoresis with Solid Phase Microextraction

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doi: 10.20964/2021.06.06

Received: 19 January 2021 / Accepted: 26 March 2021 / Published: 30 April 2021

An efficient method for simultaneous determination of seven carbamate pesticides in vegetable was established based on purifying and enriching by solid phase microextraction, separating by capillary electrophoresis (CE) and detecting by column end electrochemiluminescence (ECL). The effects of acidity, time, temperature, ionic strength and eluent on the recovery of seven pesticides in sample solutions were investigated. The best purification and enrichment parameters of 0.2 g hollow fiber in 10.0 mL extraction solution are: pH value 6, extraction time 35 min, extraction temperature 50°C, NaCl 1.5 g, and 2.0 mL acetonitrile (containing 5% formic acid) as eluent. The effects of acidity, salt concentration, additive concentration and separation voltage on the resolution of seven pesticides in separation medium were investigated. The phosphate buffer solution (PBS) containing 45 mmol/L NaCl and 25 mmol/L cyclodextrin was used as separation solution of CE. The pH of PBS is 6.5. The separation voltage is 17 kV. There are good linear relationships between the mass concentrations of seven carbamate pesticides and their ECL intensities. Their detection limits were 0.1-0.5 µg/L. The recoveries of standard addition for vegetable samples were 86.1%-115.8%. The method is rapid and accurate for the determination of carbamate pesticides in vegetables.

Keywords: Carbamate pesticide, Vegetable, Solid phase microextraction, Capillary electrophoresis

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