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# Rapid Analysis of Water- and Fat-Soluble Vitamins by Electrokinetic Chromatography with Polymeric Micelle as Pseudostationary Phase

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## Abstract

A novel polymeric micelle, formed by random copolymer poly (stearyl methacrylate-*co*-methacrylic acid) (P(SMA-*co*-MAA)) has been used as pseudostationary phase (PSP) in electrokinetic chromatography (EKC) for simultaneous and rapid determination of 11 kinds of water- and fat-soluble vitamins in the work. The running buffer consisting of 1% (w/v) P(SMA-*co*-MAA), 10% (v/v) 1-butanol, 20% (v/v) acetonitrile, 30 mM Palitzsch buffer solution (pH 9.2) was applied to improve the selectivity and efficiency, as well as to shorten analysis time. 1-Butanol and acetonitrile as the organic solvent modifiers played the most important roles for rapid separation of these vitamins. The effects of organic solvents on microstructure of the polymeric micelle were investigated. The organic solvents swell the polymeric micelle by three folds, lower down the surface charge density and enhance the microenvironmental polarity of the polymeric micelle. The 11 kinds of water- and fat-soluble vitamins could baseline separated within 13 min. The method was applied to determine water- and fat-soluble vitamins in commercial vitamin sample, the recoveries were between 93% and 111% with the relative standard derivations (RSDs) less than 5%. The determination results matched the label claim.

**Key words:** polymeric micelle; organic solvent modifier; microstructure; vitamins

## 1. Introduction

Vitamins are a group of organic substances, which are minor but essential to human health and normal growth. These compounds can be classified in two main groups: water- and fat-soluble vitamins. To human being, vitamins could only be gotten from food and nourishment. Thus, it is meaningful to develop an analysis method for rapid and simultaneous determination of water- and fat-soluble vitamins.

High-performance liquid chromatograph (HPLC) was widely used to determine water- and

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