

亲水相互作用色谱-高分辨质谱法测定水样中 7 种氨基酸含量

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摘要: 氨基酸作为蛋白质的组成部分, 在生物体新陈代谢中发挥中重要作用。建立氨基酸化合物快速准确的分析检测方法对于分析测试平台支撑生命科学、医工交叉、环境健康等相关学科的发展具有重要意义。本研究建立了亲水作用超高效液相色谱-静电场轨道阱高分辨质谱技术测定氨基酸的方法。在 Glycan BEH Amide (150 mm×2.1 mm, 1.7 μm) 色谱柱上进行色谱分离, 以 0.3 mL/min 的流速进行梯度洗脱。7 种氨基酸化合物在 0.5~80 μM 范围内线性关系良好, 相关性 $R^2 \geq 0.9915$, 检出限 (LOD) 和定量限 (LOQ) 分别小于 1 μM 和 5 μM, 回收率在 86.13%~118.8% 之间, 相对标准偏差 (RSD) 为 1.9%~11.9%, 日内和日间精密度的相对标准偏差 (RSD) 分别小于 12.8% 和 13.3%。该方法具有快速、高效和样品消耗少等优点, 可用于氨基酸的分析测定, 为相关学科的发展提供了分析技术支持。

关键词 亲水相互作用色谱; 高分辨质谱; 氨基酸

Determination of seven amino acid in water by hydrophilic interaction liquid chromatography-high resolution mass spectrometry

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Abstract: Amino acids, as building blocks of protein, play an important role in the metabolism of organisms. It is of great significance to establish a rapid and accurate detection method for amino acid compounds to support the development of life science, interdisciplinary medical engineering and environmental health related disciplines for analytical testing platforms. A rapid and accurate method for the determination of amino acids by hydrophilic interaction ultra-high performance liquid chromatography coupled with electrostatic field orbit trap high-resolution mass spectrometry has been developed. The chromatographic separation was carried out on a Glycan BEH Amide (150 mm×2.1 mm, 1.7 μm) column with gradient elution at a flow rate of 0.3 mL/min. The seven

amino acid compounds showed good linearity in the range of 0.5-80 μM with the correlation $R^2 \geq 0.9915$, and the limits of detection (LOD) and limits of quantification (LOQ) were less than 1 μM and 5 μM , respectively. The recoveries were in the range of 86.13%~118.8% with the relative standard deviations (RSDs) of 1.9%~11.9%, and the relative standard deviations for the intra-day and inter-day precision (RSD) were less than 12.8% and 13.3%. This method is fast, efficient, and less sample-consuming for the determination of 7 amino acids. It provides analytical technical support for the development of related disciplines.

Keywords: hydrophilic interaction liquid chromatography (HILIC); High resolution mass spectrometry; Amino acid