

固相萃取膜技术用于自来水中丙烯酰胺的测定

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Application of solid phase extraction disk in the determination of acrylamide in tap water

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摘要 开发了一种简便快速的固相萃取膜(SPE disk)技术,实现了对500 mL自来水中微量丙烯酰胺的富集,采用高效液相色谱法(HPLC)完成其定性和定量测定。比较不同填料的吸附情况,选择活性炭作为丙烯酰胺的最佳吸附剂。考察了洗脱剂种类、洗脱剂体积、洗脱速率和穿透体积等条件对萃取结果的影响,优化了色谱分离条件。经膜萃取过的丙烯酰胺在0.05~0.5 mg/L质量浓度范围内,其峰面积与质量浓度的线性关系良好,相关系数为0.998,检出限为20 ng/L。该方法对不同体积、不同浓度的丙烯酰胺溶液的回收率为94.12%~100.2%,相对标准偏差为2.09%~4.51%(n=3),自来水样品的加标回收率为79.96%。该方法操作简单、快速、灵敏度高,适合对水样中丙烯酰胺的测定。

关键词: 高效液相色谱 固相萃取膜 活性炭 丙烯酰胺 自来水

Abstract: A simple and fast method of solid phase extraction (SPE) disk for the determination of trace acrylamide was developed. Using this new technique along with high performance liquid chromatography (HPLC) and ultraviolet spectroscopy (UV) detection, the feasibility of SPE disk method for rapid enrichment was demonstrated in the determination of trace acrylamide in 500 mL tap water. Active carbon was chosen as the adsorbent to be incorporated into the SPE disk as it gave the best adsorption efficiency. Experimental parameters including solvent, elution volume, elution rate, breakthrough volume were optimized to give the highest efficiency of extraction. Under proper chromatographic conditions, acrylamide was easily separated from other impurities. A linear relationship between peak area and mass concentration in the range 0.05–0.5mg/L of acrylamide was established with a correlation coefficient of 0.998. The limit of detection was 20 ng/L. The recoveries for acrylamide with different concentrations and volumes ranged from 94.12% to 100.2%. The relative standard deviations (RSDs) were 2.09%–4.51% (n=3). The recovery for acrylamide spiked into a tap water sample was 79.96%. The method is simple, fast, sensitive and suitable for the determination of acrylamide in tap water.

Keywords: high performance liquid chromatography (HPLC) solid phase extraction disk active carbon acrylamide tap water

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