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基于中空纤维液相微萃取的麻黄碱和伪麻黄碱优势构象的确定及含量测定

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Analysis of the preferred conformations and determination of the concentrations of ephedrine and pseudoephedrine based on hollow fiber liquid-phase microextraction

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摘要 利用中空纤维液相微萃取方法(HF-LPME)分析麻黄碱和伪麻黄碱在不同基质中的优势构象,阐明了麻黄碱和伪麻黄碱的萃取机理;结合高效液相色谱(HPLC)建立了微量麻黄碱和伪麻黄碱的分离测定方法。以聚偏氟乙烯中空纤维为有机溶剂载体,正己醇为萃取溶剂,麻黄碱和伪麻黄碱的NaOH(5 mol/L)溶液为样品相,0.01 mol/L H_2SO_4溶液为接收相,在1200 r/min转速下萃取35 min,收集萃取液直接进行HPLC分析。麻黄碱和伪麻黄碱在水溶液中的线性范围为5～100 μg/L,检出限分别为1.9 μg/L和1.2 μg/L,富集倍数分别为38和61倍,平均回收率分别为100.6%±1.2%和103.2%±3.5%;在鼠尿液中的线性范围为100～5×104 μg/L,检出限分别为30 μg/L和42 μg/L,富集倍数分别为20和17倍,平均回收率分别为108.4%±4.4%和106.1%±5.4%。研究表明该方法操作简单,选择性高,适用于微量麻黄碱的含量测定和分析。

关键词： 中空纤维液相微萃取 优势构象 萃取机理 麻黄碱 伪麻黄碱 草麻黄 鼠尿

Abstract： The preferred conformations of the ephedrine and pseudoephedrine in Ephedra sinica Stapf and rat urine were analyzed by the hollow fiber liquid-phase microextraction (HF-LPME) and their extraction mechanisms were illuminated. The method of the separation of the ephedrine and pseudoephedrine and the determination of their concentrations with high performance liquid chromatography (HPLC) were established. The optimal experimental conditions were as follows: the organic phase carrier was the hollow fiber of polyvinylidene fluoride (MOF-503), organic solvent was n-hexanol, the extraction time was 35 min, the stirring rate was 1200 r/min, the sample phase was the NaOH solution (5 mol/L) of the analyte, the acceptor was 0.01 mol/L H_2SO_4 solution. The extracts were analyzed by HPLC. Under the optimal conditions, the method is convenient and highly sensitive. In Ephedra sinica Stapf, the linear ranges of ephedrine and pseudoephedrine were 5~100 μg/L, the detection limits were 1.9 μg/L and 1.2 μg/L and the enrichment factors were 38 and 61, respectively. The average recoveries of ephedrine and pseudoephedrine were 100.6%±1.2% and 103.2%±3.5%, respectively. In rat urine, their linear ranges were 100~5×104 μg/L, the detection limits were 30 μg/L and 42 μg/L and the enrichment factors were 20 and 17, respectively. In rat urine, their average recoveries were 108.4%±4.4% and 106.1%±5.4%, respectively. The obtained results indicated that the method can be successfully applied for the extraction and determination of the ephedrine and pseudoephedrine in Ephedra sinica Stapf and rat urine.

Keywords： hollow fiber liquid-phase microextraction preferred conformation extraction mechanism ephedrine pseudoephedrine Ephedra sinica Stapf rat urine

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