

李飞,沈春花,曾庆玲,赵志领.污水厂污泥中全氟烷基表面活性剂的高灵敏检测方法优化[J].环境科学学报,2012,32(7):1620-1630

污水厂污泥中全氟烷基表面活性剂的高灵敏检测方法优化

Optimization of sensitive determination of perfluoroalkyl surfactants in sewage sludge

关键词: [全氟烷基表面活性剂](#) [污水污泥](#) [检测方法优化](#)

基金项目: [国家自然科学基金项目\(No. 51108197\)](#); [福建省自然科学基金项目\(No. 2011J05135,2011J01318\)](#); [国务院侨务办公室科研基金项目\(No. 10QZR08, 11QZR08\)](#); [华侨大学引进高层次人才科研启动金项目\(No. 10BS213\)](#)

作者 单位

李 飞 华侨大学土木工程学院,厦门 361021

沈春花 华侨大学土木工程学院,厦门 361021

曾庆玲 华侨大学土木工程学院,厦门 361021

赵志领 华侨大学土木工程学院,厦门 361021

摘要: 为了保证短链和长链全氟烷基表面活性剂(PASs)均具有较高的回收率,并尽量提高方法的选择性、灵敏度和精密度,对污泥中PASs的检测方法进行了优化.在选择合适固相萃取柱的基础上,对超声波辅助溶剂萃取进行优化,以解决全氟十四烷酸(PFTA)等长链PASs回收率低的问题.同时,改造液质系统以减弱全氟辛酸(PFOA)的溶出干扰,并优化仪器检测方法以获取更佳的方法检出限(MDL)和方法定量限(MQL).研究表明,各种PASs的MDL和MQL分别在 $0.05\sim 0.20\text{ ng}\cdot\text{g}^{-1}$ 和 $0.20\sim 0.40\text{ ng}\cdot\text{g}^{-1}$ 的范围内,回收率介于 $81\%\pm 10\%\sim 118\%\pm 11\%$ 的范围内,相对标准偏差(RSD)介于 $3\%\sim 17\%$ 的范围内,这说明优化后的检测方法在检测污泥样品时具有较高的灵敏度、准确性和精密度.

Abstract: The analysis method for determination of perfluoroalkyl surfactants (PASs) in sewage sludge was optimized in order to simultaneously get the better recoveries of short- and long-chain PASs and to improve the methodological selectivity, sensitivity, and precision. Based on selection of suitable cartridges for solid phase extraction (SPE), the sonication solvent extraction was optimized to overcome the low recoveries of long-chain PASs such as perfluorotetradecanoic acid (PFTA). Meanwhile, the liquid chromatography tandem mass spectrometry system was improved to mitigate the influence of perfluorooctanoic acid (PFOA) leachate on qualitative and quantitative analysis, and then the instrumental analysis method was optimized for better method detection limits (MDL) and method quantification limits (MQL). The results indicated that the MDL and MQL of all PASs ranged from $0.05\text{ ng}\cdot\text{g}^{-1}$ to $0.20\text{ ng}\cdot\text{g}^{-1}$ and from $0.20\text{ ng}\cdot\text{g}^{-1}$ to $0.40\text{ ng}\cdot\text{g}^{-1}$, respectively, while the PASs recoveries and their relative standard deviations (RSD) were in the range of $81\%\pm 10\%\sim 118\%\pm 11\%$ and $3\%\sim 17\%$, respectively. These data strongly indicated that this specific-method was sensitive, precise, and accurate enough for determination of PASs in sewage sludge.

Key words: [perfluoroalkyl surfactants](#) [sewage sludge](#) [analytical method optimization](#)

摘要点击次数: 375 全文下载次数: 208

[关闭](#)[下载PDF阅读器](#)

您是第1734483位访问者

主办单位: 中国科学院生态环境研究中心

单位地址: 北京市海淀区双清路18号 邮编: 100085

服务热线: 010-62941073 传真: 010-62941073 Email: hjxxb@rcees.ac.cn

本系统由北京勤云科技发展有限公司设计