



【本文引用格式】

刘菲,王媛媛,陈家玮.土壤中单环芳烃定量分析的基质效应研究[J].岩矿测试,2010,29(5):481-485

土壤中单环芳烃定量分析的基质效应研究

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Matrix Effect on Quantitative Analysis of Mononuclear Aromatics in Soil Sample

投稿时间: 2010-01-18 最后修改时间: 2010-07-26

DOI:

中文关键词: [土壤](#) [单环芳烃](#) [顶空进样](#) [气相色谱-质谱法](#) [吸附](#)

英文关键词: [soil](#) [mononuclear aromatics](#) [headspace sampling](#) [gas chromatography-mass spectrometry](#) [absorption](#)

基金项目:国家自然科学基金项目资助(40972162);国土资源地质大调查——地下水污染测试技术研究项目资助(1212010634607)

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中文摘要:

来源于燃料油泄露的单环芳烃对土壤的污染已经成为一个很普遍的现象,因此,准确、高效地检测土壤中的挥发性单环芳烃是一个很关键的问题。文章通过在标准系列中加入石英砂和土壤两种基质,比较水、水-石英砂、水-土壤3个定量库中得到的标准曲线的斜率,研究基质效应对土壤样品定量的影响。结果表明,芳香烃类物质在土壤基质中的斜率总体小于在石英砂基质中的斜率,在石英砂基质中的斜率比在水基质中的斜率小1%(苯)~9%(正丁苯),在水基质中得到的斜率最大;只有苯在土壤基质和水基质中的斜率相当,其余组分在土壤基质中的斜率比在水基质中的斜率小9%(丙苯)~24%(1,2,4-三氯苯)。单环芳烃在土壤基质中相对斜率的大小与化合物本身的沸点以及辛醇-水分配系数呈负相关。研究表明,在对土壤样品进行校准的过程中,选择合适的基质建立定量库是一个非常关键的因素。

英文摘要:

Soil pollutin from mononuclear armatics due to fuel oil leakage has become a universal phenomenon and it is critical to precisely and efficiently determine volatile mononuclear aromatics in the soil. In Standard Method 5021 released by U.S. Environmental Protection Agency, headspace-GC-MS method is recommended to detect volatile mononuclear aromatics in the soil and the quantification library established based on aqueous solution is employed. But the accuracy of quantification results is still worth discussing. In this paper quartz sand and soil are added into the standard series to establish the quantification libraries and the slopes of calibration curves in the water, water-sand, water-soil are compared in order to study the matrix effect on quantification. The results indicate that, in general, the slope of mononuclear aromatics in soil matrix is less than that in quartz sand matrix, and the slope of mononuclear aromatics in water matrix is maximum. The slope of mononuclear aromatics in quartz sand matrix is approximately 1% (benzene)~9% (*n*-butylbenzene) less than that in water matrix. Only for benzene, the slope in soil matrix can be nearly equal to that in water matrix. Other components in soil matrix have slopes which are about 9% (propyl benzene)~24% (1,2,4-trichlorobenzene) less

than that in water matrix. The relative slope of mononuclear aromatics in soil matrix negatively correlates to the boiling point of the compounds and the partition coefficient between octanol and water. The experiment results show that it is very critical to select suitable matrix to establish the quantification library for the calibration of soil samples.

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