

研究论文

## 微滴液相微萃取技术用于气相色谱-质谱法测定食品中的酞酸酯

李玫瑰, 李元星, 毛丽秋

湖南师范大学 化学生物学和中药分析省部共建教育部重点实验室, 湖南 长沙 410081

收稿日期 2006-4-5 修回日期 2006-6-15 网络版发布日期 2007-2-9 接受日期

**摘要** 将一种新型、简单、快速、环境友好的萃取方法微滴液相微萃取(SDME)与气相色谱-质谱法结合用于快速分析食品中的几种酞酸酯(PAEs)。考察了萃取溶剂的种类及用量、微液滴在样品溶液中的深度、萃取时间及搅拌子的搅拌速度对微滴液相微萃取的影响。优化的萃取条件为:萃取溶剂为2.0  $\mu\text{L}$  甲苯,微液滴在样品溶液中的深度为0.75 cm,搅拌速度为1000 r/min,萃取时间为20 min。该方法的线性范围为0.1~4000  $\mu\text{g/L}$ ,检测限为25 ng/L~0.8 mg/L,加标回收率为87.1%~114.4%,相对标准偏差为4.9%~11.6%。微滴液相微萃取所需的有机溶剂量很小,是一种快速、简单、安全、有效的水溶性样品的前处理方法。

**关键词**

[微滴液相微萃取](#) [气相色谱-质谱法](#); [酞酸酯](#) [食品](#)

分类号

## Application of Single Drop Microextraction in the Determination of Phthalate Esters in Food by Gas Chromatography-Mass Spectrometry

LI Meigui, LI Yuanxing, MAO Lijiu

Key Laboratory of Chemical Biology and Traditional Chinese Medicine Research, Ministry of Education, Hunan Normal University, Changsha 410081, China

### Abstract

A novel, simple, fast and environment-friendly method based on single drop microextraction (SDME) was developed for the determination of phthalate esters in food by gas chromatography-mass spectrometry (GC-MS). The effects of the nature of organic solvents, microdrop volume, the depth of microdrop in sample solution, extraction time and stirring rate on the extraction efficiency were investigated separately. The optimal SDME conditions, 2.0  $\mu\text{L}$  of toluene, 0.75 cm of the depth of microdrop, 1000 r/min of stirring rate and 20 min of extraction time, were obtained and used for the analysis of dimethyl phthalate (DMP), diethyl phthalate (DEP), di-n-butyl phthalate (DBP), dioctyl phthalate (DOP) and diethylhexyl phthalate (DEHP) in food. At first, a sample was dissolved with de-ionized water and then extracted with ultrasonication for 15 min. Then, it was filtrated and the solution was extracted and concentrated by a single drop of a solvent. Finally, it was analyzed by GC-MS. The reproducibility, linearity, recovery, and limit of detection of the method were studied. The results showed that the limits of detection (LOD) were between 25 ng/L and 0.8 mg/L. The overall recoveries were 87.1%~114.4% with the relative standard deviations of 4.9%~11.6%. This method has been successfully applied to the analysis of food samples.

### Key words

[single drop microextraction \(SDME\)](#) [gas chromatography-mass spectrometry \(GC-MS\)](#) [phthalate esters \(PAEs\)](#) [food](#)

DOI:

通讯作者 毛丽秋 [rose9910201@yahoo.com.cn](mailto:rose9910201@yahoo.com.cn)

### 扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(1249KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“](#)

[微滴液相微萃取” 的相关文章](#)

▶ [本文作者相关文章](#)

· [李玫瑰](#)

· [李元星](#)

· [毛丽秋](#)