

研究论文

## 气相色谱-质谱法分析蜂蜜中的多种农药残留

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收稿日期 2005-9-20 修回日期 2006-2-21 网络版发布日期 2006-10-13 接受日期

**摘要** 开展了蜂蜜中23种农药残留的气相色谱-电子轰击离子源质谱(GC-EI/MS)分析方法的研究,并对其中3种农药的EI/MS碎片离子的断裂机理与结构进行了初步解析。探讨了蜂蜜试样前处理条件的优化与选择。将蜂蜜试样用乙酸乙酯提取剂超声提取、Florisil硅藻土色谱柱净化和正己烷-乙酸乙酯(体积比为7:3)混合洗脱剂洗脱后,以PCB103为内标物,采用选择离子监测(SIM)方式下的GC-EI/MS分析。当试样的加标浓度为50,100和200 μg/kg时,加标回收率为82%~120%,相对标准偏差小于11.0%。23种农药的检测限都小于10.0 μg/kg,线性范围为10~500 μg/kg,相关系数都大于0.995。此分析方法已成功地应用于蜂蜜中23种痕量农药残留的分析。

**关键词** [气相色谱-质谱](#) [蜂蜜](#) [氨基甲酸酯](#) [有机磷](#) [拟除虫菊酯](#) [农药残留](#)

分类号

## Determination of Multiple Pesticide Residues in Honey Using Gas Chromatography-Mass Spectrometry

### Abstract

An analytical method was developed for the simultaneous determination of 23 pesticide residues in various commercial honeys. Meanwhile, the characteristic ions and fragmentation mechanism of three pesticides in the process of electron ionization mass spectrometry (EI/MS) were evaluated. After the optimization of different parameters such as the extraction solvent, pesticides were extracted from honey with ethyl acetate in an ultrasonic bath, cleaned up on a Florisil column by an elution of mixture of hexane and ethyl acetate (7: 3,v/v), and analyzed by gas chromatography-electron ionization mass spectrometry (GC-EI/MS) in the selected ion monitoring mode (SIM) with PCB103 as internal standard. Recovery studies were performed at 50, 100 and 200 μg/kg fortification levels for each pesticide, and the recoveries ranged from 82% to 120% with relative standard deviations between 1.8% and 11.0% for different pesticides. The limit of detection was less than 10.0 μg/kg for all the pesticides. The developed method was linear in the range of 10-500 μg/kg, with correlation coefficients larger than 0.995. Finally, the developed analytical method has been successfully applied to the determination of pesticide residues in several honey samples.

**Key words** [gas chromatography-mass spectrometry](#) [honey](#) [carbamate](#) [organophosphorus](#) [pyrethroid](#) [pesticide residue](#)

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