

## 中心切割式多维气相色谱/质谱系统中中点限流器的改进及其在卷烟烟气中苯并[a]芘的检测

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## Modification of mid-point restrictor of heart cut multidimensional gas chromatography-mass spectrometry system and its application in analysis of benzo [a] pyrene in cigarette smoke

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摘要	参考文献	相关文章
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**摘要** 对多维气相色谱的核心部件中点限流器进行了改进,用一段0.25 mm i.d.毛细管柱取代石墨限流管,Y形玻璃压合连接器取代两孔石墨限流器,提高了第一维色谱保留时间的稳定性,保证了中心切割范围的准确性,且消除了石墨对苯并[a]芘的吸附残留。同时,将本系统应用于卷烟中苯并[a]芘的检测。采用剑桥滤片捕集烟气颗粒物,环己烷萃取,以氘代苯并[a]芘为内标,直接用中心切割式多维气相色谱/质谱(MDGC-MS)测定。该法线性关系良好,其线性范围为1.47~29.4 µg/L (r<sup>2</sup>=0.9999);重复性好,测得实际样品中苯并[a]芘含量的相对标准偏差为1.94%;回收率为90.74%~101.86%;检出限和定量限分别为0.31 ng/支及1.03 ng/支,可以满足检测要求。应用本系统对2R4F Kentucky 卷烟烟气中苯并[a]芘进行了检测,结果与文献报道值基本一致。

**关键词:** 中点限流器 多维毛细管气相色谱 质谱 苯并[a]芘 卷烟烟气

**Abstract:** The mid-point restrictor, known as the key spare part of multidimensional gas chromatography (MDGC) was modified and applied in the determination of benzo [a] pyrene in cigarette smoke. The graphite restrictor was replaced by a 0.25 mm i.d. fused silica open tubular and the two-hole graphite ferrule was replaced by a press-fit glass ferrule to improve the stability of retention time on the 1st dimensional column and eliminate the carry-over effects of benzo [a] pyrene. The cigarette samples were prepared as follows: The mainstream cigarette smoke collected on Cambridge pad was extracted with cyclohexane, then the extractant was analyzed by heart cut MDGC-mass spectrometry (MS) directly with benzo [a] pyrene-d12 as internal standard. The method was proved to be simple, sensitive, fast and reliable with good linearity (linear range of 1.47-29.4 µg/L, r<sup>2</sup> of 0.9999), reproducibility (relative standard deviation (RSD) of 1.9%), recovery (90.74%-101.86%) and low quantitative and qualitative detection limits. Moreover, the amount of benzo [a] pyrene in the 2R4F Kentucky reference cigarette smoke obtained by this method was close to that reported in literature. **Keywords:** mid-point restrictor multidimensional capillary gas chromatography (MDGC) mass spectrometry benzo [a] pyrene cigarette smoke

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