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“质谱技术与环境应用”专栏

大气颗粒物中三类有机组分的萃取分离净化和GC/MS测定

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摘要 大气颗粒物中有机组分污染特征的研究，对我国城市空气质量监控与治理有重要意义。应用中流量P$M_{2.5}$采样器采集2003年9月~2004年7月北京市大气颗粒物样品，建立了同时测定$PM_{2.5}$中三类有机组分的实验方法。采用14%BF_3/CH_3OH溶液为有机酸衍生化试剂，并确定有机酸最佳衍生化反应温度和时间分别为40 ℃、45 min；采用自填SPE硅胶柱，实现了正构烷烃、多环芳烃和有机酸酯的完全分离，三类组分回收率都在70%~130%之间。采用GC/MS法定量检出76种化合物，包括C_{10}~C_{34}之间的25种正构烷烃，16种美国EPA优控PAH_s，35种有机酸，这些有机酸包括diC_2~diC_{11}之间的10种二元酸、C_{10}~C_{32}之间的23种饱和脂肪酸以及$C_{18:1}$、$C_{18:2}$2种不饱和酸。

关键词 大气颗粒物 正构烷烃 多环芳烃 有机酸 GC/MS 衍生化

分类号

Extraction, Separation and Purification of Three Kind of Organic Species in Atmospheric Particulate Matter and the Measurements by GC/MS

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Abstract Organic aerosols were sampled by applying medium-flow $PM_{2.5}$ sampler during September 2003 to July 2004 in Beijing. This study built an optimum condition on the basis of solid phase extract(SPE) for the pretreatment of three kinds of compounds: *n*-alkanes, PAH_s and organic acids. The derivatization reagent for organic acids was 14% BF_3/CH_3OH, and the optimal derivatization time and temperature were 40 ℃ and 45 min, respectively. By using the self-filled SPE-Silica gel column, the above three kinds of compounds were seperated completely, and the recovery ranged from 70%—130%. The $PM_{2.5}$ samples were determined quantitativly by using GC/MS, including 25 alkanes, 16 priority controlled PAHs by USEPA as well as 35 organic acids.

Key words atmospheric particulate matter _ *n*-alkanes _ PAH_s _ organic acids _ GC/MS _ derivatization

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