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五氟苯基羟胺衍生与GC/MS联用分析大气中的单羰基化合物和多羰基化合物 Determination of mono- and dicarbonyls in the atmosphere using gas chromatography/mass spectrometry after PFBHA derivatization

关键词: [羰基化合物](#) [五氟苯基羟胺\(PFBHA\)](#) [气相色谱/质谱联用\(GC/MS\)](#) [乙二醛](#) [甲基乙二醛](#)

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作者 单位

邹婷 上海大学环境与化学工程学院,环境污染与健康研究所,上海 200444

冯艳丽 上海大学环境与化学工程学院,环境污染与健康研究所,上海 200444

付正茹 上海大学环境与化学工程学院,环境污染与健康研究所,上海 200444

牟翠翠 上海大学环境与化学工程学院,环境污染与健康研究所,上海 200444

翟金清 上海大学环境与化学工程学院,环境污染与健康研究所,上海 200444

摘要: 利用涂布五氟苯基羟胺(PFBHA)的Tenax-TA作为固体吸附剂,采取主动采样的方式采集大气中羰基化合物,再经溶剂洗脱和氮吹浓缩后用气相色谱/质谱(GC/MS)分析,成功检测到14种单羰基化合物和2种二羰基化合物(乙二醛与甲基乙二醛).研究表明:在吸附剂的装载量为50 mg的前提下,当衍生剂的涂布量为260 nmol,采集流速为50 mL · min⁻¹时,采集效果最佳.羰基化合物的检测限、平行样的相对标准偏差和样品的加标回收率范围分别为0.54~3.83 ng · m⁻³、1.0%~14.2%、89.2%~113.8%.该方法在实际大气样品中合适的采样时间为0.5~8.0 h.利用此法对上海市宝山区大气中羰基化合物进行了检测,成功检测到16种羰基化合物,且具有明显的日变化趋势.

Abstract: A method for detecting 14 mono- and 2 dicarbonyl compounds in one run was established. The carbonyls were collected on solid sorbent (Tenax-TA) coated with derivating agent O-(2,3,4,5,6-Pentafluorobenzyl) hydroxylamine hydrochloride (PFBHA), followed by solvent desorption, concentration and gas chromatography/mass spectrometry analysis. The coating amount and the sampling flow rate were optimized. The results showed that the best collection efficiency was achieved when the coating amount was 260 nmol and the sampling flow rate was 50 mL · min⁻¹ for a loading of 50 mg Tenax-TA. The limits of detection were in the range of 0.54~3.83 ng · m⁻³. The relative standard deviations of parallel samples were 1.0%~14.2% and the recoveries of the spiked standards were 89.2%~113.8%. The time resolution could be 30 min to 8 h for ambient air sampling. The method was successfully applied to measure 16 mono- and dicarbonyls in the ambient air of Baoshan District of Shanghai and the detected carbonyls have significant diurnal variation.

Key words: [carbonyl compounds](#); [O-\(2,3,4,5,6-Pentafluorobenzyl\) hydroxylamine \(PFBHA\)](#); [gas chromatography/mass spectrometry \(GC/MS\)](#); [glyoxal](#); [methylglyoxal](#)

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服务热线: 010-62941073 传真: 010-62941073 Email: hjxxb@rcees.ac.cn

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