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超高效液相色谱β-环糊精流动相添加剂法分析卷烟主流烟气中7种酚类化合物

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Analysis of seven compounds in mainstream cigarette smoke by ultra performance liquid chromatography using a β-cyclodextrin mobile phase additive

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摘要 以β-环糊精(β-CD)作为流动相添加剂,建立了一种超高效液相色谱(UPLC)快速分析卷烟主流烟气中对苯二酚、间苯二酚、邻苯二酚、苯酚、对甲酚、间甲酚、邻甲酚的方法。卷烟主流烟气中7种酚类化合物采用YC/T 255-2008标准方法收集,萃取液经0.22 μm微孔滤膜过滤后直接进行UPLC分析。采用ACQUIT UPLC BEH Shield RP18色谱柱,以含有4 g/L β-CD的流动相进行梯度洗脱,采用优化后的荧光检测条件进行检测,分析时间为10 min。实验结果表明: 与目前国内外普遍应用的HPLC方法相比,该方法实现了间甲酚和对甲酚异构体的有效分离,7种酚类化合物的荧光响应强度显著增加。7种酚类化合物在该方法的线性范围内线性关系良好(r>0.9999), 3个加标水平上平均回收率为95.5%～103.5%,相对标准偏差(RSD)均小于4%,方法的检出限为4～14 ng/cig。

关键词： 超高效液相色谱 β-环糊精 卷烟主流烟气 酚类化合物

Abstract： A rapid method for the analysis of hydroquinone, resorcinol, catechol, phenol, p-cresol, m-cresol, and o-cresol in mainstream cigarette smoke by ultra performance liquid chromatography (UPLC) using a β-cyclodextrin (β-CD) mobile phase additive was developed. The seven major phenolic compounds in mainstream smoke were collected with YC/T 255-2008 standard method. The extract was filtrated with 0.22 μm filtration film and then subjected to UPLC analysis. The separation was performed on an ACQUITY UPLC BEH Shield RP18 column, and the mobile phase with 4 g/L β-CD additive was used. The fluorescence detection condition was optimized. The analysis time was 10 min for one sample. Comparing with the high performance liquid chromatography (HPLC) methods published, the p-cresol and m-cresol were completely separated. In addition, the effect of β-CD on fluorescence enhancement for seven major phenolic compounds was significant. The linearity were good between the peak area and the concentration in the linear ranges of seven phenolic compounds, and the correlation coefficients were greater than 0.9999. The limits of detection of the method were 4-14 ng/cig, and the recoveries were 95.5%-103.5% with relative standard deviations (RSDs) less than 4%.

Keywords： ultra performance liquid chromatography (UPLC) β-cyclodextrin (β-CD) mainstream cigarette smoke phenolic compounds

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