·监测技术·

香樟叶片中氟化物监测方法比较

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摘　要:比较了高氯酸、硝酸－氢氧化钾和超纯水 3 种基质对香樟叶片中氟化物浸提效果以及氟离子选择电极法定量方式之间的差异,同时尝试了离子色谱法。结果表明,间歇超声 45 min 浸提满足测定要求,标准加入法定量结果更可信。高氯酸基质曲线在不同日期制备的曲线重合度、斜率转化系数和日间偏差不如其他 2 种基质,但操作简单,浸提效果好,可通过测定前调节 pH 值和添加总离子强度调节剂改善;硝酸－氢氧化钾浸提效果与高氯酸的相当或更好,精密度好,但操作步骤多;超纯水浸提平均效果是其他 2 种的 80%,叶片氟化物含量较低时与酸浸提效果相近;氟离子选择电极法与离子色谱法对叶片氟化物测定结果差异甚大,原因待查。

关键词:氟化物;浸提;氟离子选择电极;离子色谱法
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Comparation of Determination Methods of Fluorine in Camphor Leaves

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Abstract: Three different extraction methods (perchloric acid, nitric acid-potassium hydroxide and ultrapure water) were compared in determination of fluoride content in camphor leaves. In addition, instrument analysis methods including ion-selective electrode and ion chromatography were discussed. The extraction was assisted by ultrasonic for 45min, discontinuously. Perchloric acid extraction got the most efficiency, but coincidence degree of curves prepared on different days, daytime deviation and the slope of the conversion coefficient were not as good as another two, but these disadvantages could overcome by adjusting pH and ionic strength before analysing; Nitrate acid -potassium hydroxide method got similar efficiency as perchloric acid extraction, better precision, but more steps in determination procedure; ultrapure water extraction average effect is 80% of the former two. The results of ion-selective electrode and ion chromatography varied greatly, which needed further investigation.

Key words: Fluoride; Extraction; Ion-selective electrode; Ion chromatography

大气氟化物是人们关注的污染物之一,其含量升高也促使植物对氟化物的吸收增强,从而成为了植物叶片中氟的最主要来源。植物在整个生长季节都在吸收和积累大气中的氟化物,主要积累在叶片中,几乎不向其他器官转移[1]。叶片含氟量与大气氟化物浓度显著相关,用以评价大气氟化物污染水平具有很高的灵敏度和可靠性[2－4],利用植物叶片氟化物含量及其叶片受害症状反映大气氟化物污染程度的研究方法引起了大量关注[5]。这种生物监测方法可以有效补充滤膜采样/石灰滤纸采样－氟离子选择电极法等标准方法在采样时间、生物有效性方面的不足[6－7]。

植物叶片中氟化物监测前处理方法主要有灰化、酸浸提、酸碱浸提等。江苏省内环境监测机构多采用 $HClO_4$ 浸提,该方法曾列入《生物监测技术规范》(征求意见稿),但至今未正式颁布;浙江省颁布的地方标准中规定采用 HNO_3－KOH 浸提测定桑叶氟化物[8]。可见植物叶片中氟化物监测工作开展虽广泛,但是无统一方法可循。系统比较这

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