

Determination of p-aminophenol and eugenol by flow injection with inhibited chemiluminescence detection

Abstract

The recent development of chemiluminescence (CL) analysis is reviewed. The CL detection for organic compounds is described. The state of the art and future trends are discussed. It is figured out that only limited analytes can be determined because of relatively less CL system. Phenolic compounds are biologically and environmentally important compounds. The aim of the dissertation is to extend the application of luminol-DMSO-NaOH CL reaction for the determination of phenolic compounds.

A novel flow injection method for the determination of p-aminophenol (PAP) and eugenol based on the inhibition by PAP and eugenol of chemiluminescence from Luminol-DMSO-NaOH system is developed. The optimum conditions for CL detection of PAP were: pH 8.20, 1.5×10^{-4} mol/L luminol, 0.1 mol/L NaOH and 1.4 mol/L DMSO. The optimum conditions for CL detection of Eugenol were: pH 8.00, 6.0×10^{-4} mol/L Luminol, 0.1 mol/L NaOH and 0.5 mol/L DMSO.

The linear range of PAP is 0.5~10 ng/ml, and the detection limit is 0.06 ng/ml. The linear range of eugenol is 5 ng/ml~1 μ g/ml, and the detection limit is 3.00 ng/ml. The method has been applied to determine the content of PAP in wastewaters and eugenol of Chinese herbs with satisfactory results.

对氨基酚及丁香酚的流动注射化学发光抑制分析法

摘 要

本文首先对化学发光的研究现状及进展作了综述。简要介绍了化学发光试剂和化学发光体系的进展以及它们在有机化合物分析领域中的应用。目前,分析科学家仍致力寻找新的化学发光体系和扩展现有化学发光体系在有机物分析中的应用研究。

本论文利用实验室中发现的对氨基酚和丁香酚对Luminol-DMSO-NaOH化学发光体系的发光抑制作用,在此基础上,首次建立了对氨基酚和丁香酚的化学发光抑制分析法。优化了相关的化学发光条件。测定对氨基酚的最佳条件为:蠕动泵的流速 1.77ml/min, 负高压 800 V, 鲁米诺溶液pH值 8.20, 鲁米诺溶液浓度 1.5×10^{-4} mol/L, NaOH浓度 0.1mol/L, DMSO浓度 1.4mol/L; 测定丁香酚的最佳条件为:蠕动泵的流速 1.77ml/min, 负高压 800 V, 鲁米诺溶液pH值 8.00, 鲁米诺溶液浓度 6.0×10^{-4} mol/L, NaOH浓度 0.1mol/L, DMSO浓度 0.5mol/L。在最佳化学发光条件下,测定对氨基酚的线性范围为 0.5~10ng/ml, 检出限为 0.06 ng/ml; 测定丁香酚的线性范围为 5 ng/ml~1 μ g/ml, 检出限为 3.00 ng/ml。并将此法应用于工业废水中的对氨基酚的含量以及中药中的丁香酚的含量的测定,结果令人满意。

综上所述,本文建立的对氨基酚和丁香酚的化学发光抑制分析法具有灵敏度高、线性范围宽、操作简便等优点。此项工作扩展了此化学发光体系的分析应用范围,为酚类物质的分析测定开辟了新的路径。