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荧光试剂**SPAEC**的合成及分析化学特性研究

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摘要 合成了新荧光试剂2-(5'-磺基-2'-苯酚-1'-偶氮)-5-乙氨基-4-甲酚(SPAEC)。用等色点光度法测得试剂的离解常数为pK1=3.42, pK2=5.46, pK3=7.99。考察了SPAEC与金属离子的螯合显色和荧光反应; 建立了测定镓、铝的反应条件, 在PH3.8-5.4或PH4.0-5.5的乙酸缓冲介质中均形成:1型具荧光活性的有色螯合物, 可相应测定15-150ppb镓及1.5-30ppb铝, 试用于半导体及合金分析。研究了Kalman滤波荧光光度法, 实现了镓与铝的同时测定, 所适应的浓度比例范围为40:1(0)-1(0):14。

关键词 荧光分析 苯酚 P 磺基 铝 分析化学 分析特性 偶氮化合物 镓 荧光试剂 乙胺基 甲酚 P

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Synthesis and analytical characterization of SPAEC as a fluorescent reagent

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Abstract A new fluorescent reagent, SPAEC, was synthesized. The acidic dissociation constants were estimated by the isobestic point method, pK1 = 3.42, pK2 = 5.46, pK3 = 7.99. SPAEC forms color and/or fluorescent chelates with Al3+, Ga3+, In3+, Sc3+, Fe3+, Cu2+, Zr4+, Hf4+, and some of rare earth ions. The optimal conditions for fluorescent chelating formation between SPAEC and Ga3+ or Al3+ ion were established. At pH 3.8 to 5.4, with lex and lem at 515 and 585 nm, resp., quantum yield was 0.046 for Ga3+. For Al3+, at pH 4.0 to 5.5 and the lex and lem at 535(or 520) and 575 nm, resp., quantum yield was 0.104. The SPAEC chelates were 1:1 type for both Ga3+ and Al3+. The proposed method can be used for determination of 15-150 ppb Ga and 1.5-30 ppb Al in alloy and semiconductor samples with satisfactory results. Finally, a method for simultaneous determination of Ala nd Ga using SPAEC was developed by Kalman filter-fluorometry. This method improves the selectivity of a highly sensitive fluorometric method.

Key words FLUORIMETRIC ANALYSIS PHENOL P SULFO GROUP ALUMINIUM ANALYTICAL CHEMISTRY ANALYTICAL CHARACTERISTICS AZO COMPOUNDS GALLIUM FLUORESCENT REAGENT ETHYLAMINO GROUP CRESOL P

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