

研究论文

离子色谱法测定烟气脱硫海水中的亚硫酸根离子

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摘要 建立了燃煤电厂烟气脱硫海水中亚硫酸根(SO₂⁻³)的离子色谱-脉冲安培检测方法。色谱柱为IonPac AS14A阴离子交换柱,流动相为14 mmol/L NaOH-12 mmol/L Na₂CO₃溶液(pH 11.7),流速1.2 mL/min,脉冲安培法检测。因SO₂⁻³易被氧化,故在采样时加入甲醛作为保护剂,使之稳定存在。在测定海水样品前,用NaOH溶液(pH 12.0)沉淀海水中的Mg²⁺,以避免其在pH较高的流动相中生成沉淀堵塞色谱柱。采用该方法检测SO₂⁻³的线性范围为0~100 mg/L,平均回收率为116.8%,检出限为0.05 mg/L;对7.5, 25.0和75.0 mg/L的海水基底加标溶液分别进行9次平行测定,其相对标准偏差(RSD)分别为2.1%, 3.1%和4.0%。该方法具有快速、灵敏、选择性好等特点,用于烟气脱硫的海水中SO₂⁻³的检测,可得到令人满意的结果。

关键词 [离子色谱法](#) [亚硫酸根离子](#) [烟气脱硫](#) [海水](#)

Determination of sulfite in flue gas desulfurization with seawater by ion chromatography

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Abstract

The technology for flue gas desulfurization (FGD) with seawater is widely adopted by coal-fired power plants in coastal areas. SO₂ in the flue gas is absorbed by alkaline seawater and transferred in aqueous phase as sulfite (SO₂⁻³), and most SO₂⁻³ is transformed to sulfate (SO₂⁻⁴) after an aeration process. The remaining SO₂⁻³ in the seawater discharged to sea area may be harmful to marine organism because of its biological toxicity, thus it is necessary to determine the concentration of SO₂⁻³ in the seawater for desulfurization. In this study, the method of determination of SO₂⁻³ in the seawater by ion chromatography was investigated. The separation was achieved on an IonPac AS14A column with 14 mmol/L NaOH-12 mmol/L Na₂CO₃ solution as the mobile phase at a flow rate of 1.2 mL/min, and the detection was performed by a pulsed amperometric detector. Formaldehyde was added as a protective agent when sampling because the SO₂⁻³ is easy to be oxidized. To avoid the formation of Mg(OH)₂ in the mobile phase with high pH value which might block the column, the Mg²⁺ in seawater was precipitated by NaOH solution (pH 12.0) before sample determination. The method showed good linearity within the range of 0~100 mg/L with an average recovery of 116.8%. The method detection limit (MDL) reached as low as 0.05 mg/L. The relative standard deviations (RSD) for seawater matrix samples spiked at levels of 7.5, 25.0 and 75.0 mg/L were 2.1%, 3.1% and 4.0% (n=9), respectively. The method has been applied for the determination of SO₂⁻³ in flue gas desulfurization seawater with the advantages of being fast, sensitive and selective.

Key words [ion chromatography \(IC\)](#) [sulfite](#) [flue gas desulfurization](#) [seawater](#)

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