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碰撞反应电感耦合等离子体质谱法直接测定卤水中的溴碘

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Direct Measurement of Br and I in Brines by Collision Response- Inductively Coupled Plasma-Mass Spectrometry

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英文关键词: [brine](#) [Br](#) [I](#) [collision response interface mode](#) [Inductively Coupled Plasma-Mass Spectrometry](#)

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中文摘要:

目前使用电感耦合等离子体质谱法(ICP-MS)测定环境水样中的溴和碘,方法较为成熟,但应用于高盐卤水中溴碘的检测研究很少见报道。本文针对柴达木盆地盐湖卤水矿化度高、钾含量高的特点,建立了ICP-MS直接测定卤水中溴和碘的方法。采用碰撞反应接口(CR I)模式,以H₂为碰撞气体,降低了检测过程中的多原子离子质谱干扰(例如³⁹K⁴⁰Ar⁺对⁷⁹Br⁺的干扰);选用Rh作内标元素,校正高盐样品引起的基体效应、仪器漂移等非质谱干扰;通过延长快泵冲洗时间消除测定过程中的记忆效应。在优化的实验条件下,盐湖卤水样品稀释200倍后用ICP-MS测定,方法检出限溴为0.036 μg/mL,碘为0.027 μg/mL;方法精密度(RSD, n=12)溴为2.77%,碘为2.19%;加标回收率溴为91.6%~106.1%,碘为94.4%~107.7%。本方法也可应用于钾含量高的岩盐样品中溴和碘的测定。

英文摘要:

Many routine methods to determine Br and I in environmental water by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) have been reported. However, there is little information about the determination of Br and I in brine with a high salt content. In view of the high salinity and high potassium content in the salt lake brine of Chaidamu Basin, a new method for the determination of Br and I in brine by ICP-MS is proposed in this paper. The mass spectrum interference was reduced by using collision response interface mode and using H₂ as the collision gas, such as of ³⁹K⁴⁰Ar⁺ to ⁷⁹Br⁺. The interferences of the matrix elements and instrument drift were corrected by using Rh as internal standard. The memory effect was eliminated by extending the time of fast pump flushing. The proposed method was applied to directly determine levels of Br and I in salt lake brine samples, which were diluted to 200 times. Detection limit and RSD (n=12) were 0.036 μg/mL and 2.77% for Br, 0.027 μg/mL and 2.19% for I. Values of recovery obtained were in the range of 91.6%-106.1% for Br and 94.4%-107.7% for I. The established method is also suitable for measuring Br and I for high potassium rock salt samples.

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