

萃取色层分离同位素稀释ICP-MS测定空气中费克量钚

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摘要 ICP-MS测定环境样品中超痕量 ^{239}Pu 时, $^{238}\text{UH}^+$ 会对 $m/z239$ 的测量带来干扰。测得 UH^+ 的产生几率为 4.6×10^{-5} ,通过三正辛胺色层分离后,对铀的去除率为 10^4 ,可以有效地去除 $^{238}\text{UH}^+$ 离子峰对 ^{239}Pu 测定的干扰。钚的回收率为75%。同位素稀释法对 ^{239}Pu 的检出限为 $4.5 \times 10^{-15} \text{g/mL}$,方法的定量测定限为 $16 \times 10^{-15} \text{g/mL}$ 。用所建立的方法测得我国某地区空气中 ^{239}Pu 的浓度为 $4.8 \times 10^{-17} \text{g/m}^3$ 。

关键词 萃取 电感耦合等离子体质谱 钚 三辛胺

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Determination of femto-gram plutonium by extraction chromatography using isotope dilution inductively coupled plasma mass spectrometry

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Abstract This work reports the determination of femto-gram plutonium using isotope dilution ICP-MS. The interference of protonated uranium at m/z of 239, with a determined UH^+/U^+ ratio of 4.6×10^{-5} , was removed by using tri-n-octylamine extraction chromatography. The separation factor of 10^4 was achieved for uranium and the recovery of plutonium was greater than 75%. By applying isotope dilution, femto-gram range of plutonium was measured using a high-resolution ICP-MS with a sample volume of less than 1 mL. The limit of detection of ^{239}Pu is $4.5 \times 10^{-15} \text{g/mL}$ for standard solution, and $16.3 \times 10^{-15} \text{g/mL}$ for real sample with matrix. The concentration of ^{239}Pu in region atmosphere was determined at a level of $(4.8 \pm 2.9) \times 10^{-17} \text{g/m}^3$.

Key words [EXTRACTION](#) [PLUTONIUM](#) [TRIOCTYLAMINE](#)

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