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过筛粒径大小对HPGe_v谱仪测定¹³⁷Cs和²¹⁰Pb的影响

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摘要: 2.00mm通常被作为实验室测定土壤中环境放射性核素¹³⁷Cs和²¹⁰Pb比活度时土壤样品过筛粒径,但有关不同过筛粒径对测量准确性的影响评价鲜有报道。本研究选择了褐土、栗钙土和紫色土等3种代表性土壤,经4种过筛粒径2.00、1.00、0.50和0.25mm处理后,利用HPGe_v谱仪测定了处理土样中的¹³⁷Cs和²¹⁰Pb比活度。¹³⁷Cs测量结果显示,相比2.00mm的粒径,0.25mm粒径能减少样品中¹³⁷Cs分析精度达到可接受值的时间,同时对比活度测量值具有积极影响;对²¹⁰Pb而言,过筛粒径的减小会造成分析精度达到可接受值时间的延长,但对比活度的测量值影响并不显著。研究结果在提高利用HPGe_v谱仪准确测定环境样品中的¹³⁷Cs和²¹⁰Pb比活度方面具有重要意义。

关键词: ¹³⁷Cs和²¹⁰Pb 过筛粒径 分析精度 土壤样品

DETERMINATION OF ¹³⁷Cs AND ²¹⁰Pb USING HPGe_v SPECTROMETRY AS INFLUENCED BY DIFFERENT SIEVE DIAMETERS

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Abstract: Standard sieve diameter is often set as 2.00 mm to determine specific activity of ¹³⁷Cs and ²¹⁰Pb in soil samples, but it is rarely reported that whether the size of the different screening will affect the accuracy of such determination. In this study, three representative soils were employed to assess the effects of different sieve sizes on measurement of ¹³⁷Cs and ²¹⁰Pb activity in soil samples by using HPGe_v spectrometer. The targeted soil samples each were screened through the four sieve diameters 2.00, 1.00, 0.50 and 0.25 mm, respectively. It was observed that the sample of 0.25 mm took less time to reach the acceptable value of ¹³⁷Cs analysis precision and higher value of the specific activity in the three soils compared to the 2.00 mm sifting sample. As for ²¹⁰Pb measurement, the decrease of sieve diameters extended to touch the acceptable value of analysis precision but showed no significant effect on the specific activity. These results played an important role in enhancing the analysis precision of the specific activity of ¹³⁷Cs and ²¹⁰Pb in soil samples using HPGe_v Spectrometry.

Keywords: ¹³⁷Cs and ²¹⁰Pb Sieve diameter Analysis precision Soil samples

收稿日期 2012-01-16 修回日期 2012-05-17 网络版发布日期

DOI:

基金项目:

国家自然科学基金资助项目(41171231, 31000944);国际原子能机构项目(IAEA research contract No. 15479, 15938, 16290, 16941)

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