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Initial study on determination of uranium in wiped samples by Total reflection X ray fluorescence spectrometry

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The analysis of wipe samples is of great importance in nuclear safeguards. Total reflection X ray fluorescence spectrometry as a trace nondestructive analysis method can preliminarily analyze the wipe samples and provide references for screening, making it easier to make follow-up analysis plans. The method of determining uranium in wiped samples by full reflection X ray fluorescence spectrometry was preliminarily discussed in the experiment, and the simulated samples were measured.

The mixed standard uranium solution was prepared with six elements including Pb, Ni, Zr, Fe, Zn, Cr, etc., and Pb, Ni and Zr were obviously interfered in SIMS. Fe, Zn and Cr are common elements in the environment, which represent the three elements of high, medium and low levels in the environment. The internal standard element Ga was added for quantitative analysis. 10 μ L the mixed standard solution was taken and added to the sample plate and placed on the heating plate in the 60-70 °C for drying. The total reflection X-ray analyzer was used. The results showed that the relative error of the method was less than 10% when the uranium content was less than 50ng. Under 1000 ng for the amount of impurities, the X-ray features of each element peak width is narrow, and the characteristics of X-ray wavelength absorption edge is not very close, so there is no basic interference between each element. The measurement errors of Pb, Ni, Zn, Fe and Cr were all within 10%. The determination of zirconium element is high, which may be due to the similarity between the characteristic X-ray wavelength and molybdenum excitation of zirconium, and the interference to had been when measuring of zirconium. The accurate measurement of Pb and Ni can provide useful information when measuring the uranium particles by SIMS.

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