CHARATERIZATION OF HIGHLY ENRICHED URANIUM IN A NUCLEAR FORENSICS EXERCISE P43

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This paper presents the characterization of two metal samples of highly enriched uranium as a contribution of Poços de Caldas Laboratory, LAPOC, a branch of Brazilian National Commission for Nuclear Energy, CNEN, to the Round Robin 3, RR3, coordinated by the Nuclear Forensics International Technical Working Group. A scenario was constructed in which two separate seizures of nuclear material occurred and forensics analysis was requested to help discern whether these incidents were related and whether these incidents exceeded country statutes. Laboratories were instructed to submit assessment reports in 24 hours, one week, and two month timeframes. Besides preliminary evaluations for categorization of the material, our laboratory applied high resolution gamma spectrometry, optical emission spectrometry by inductively coupled plasma, and potentiometric titration for quantitative characterization of the samples. Concerning our technical reports answers for the three main forensics questions formulated by RR3, one of them was inconclusive, considering that LAPOC did not yet have all essential equipment for a fully satisfactory forensics nuclear analysis.

URANIUM ISOTOPE RATIO MEASUREMENTS BY LA-HR-ICP-MS P41

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This work describes the utilization of LA-HR-ICP-MS (laser ablation high resolution inductively mass spectrometry) for characterize the uranium isotope ratio of a UO_2 pellet supplied and certified by New Brunswick Laboratory (NBL). This method is useful measurements of ^{233}U, ^{234}U, ^{235}U, ^{236}U and ^{238}U, reaching relative standard deviations (RSD) from 1.55% to 2.45%. The Laser ablation ICP-MS technique shows a high level of instability, compromising the precision of the measurements, although could be made some adjustments to improve its stability. To reach the better stability were made the adjustments of laser ablation and ICP-MS parameters, such as RF power, laser beam diameter, defocusing of laser beam, auxiliary gas and sample gas. The parameters which caused the greatest impact in order to improve the stability signal were RF power, defocusing and laser beam diameter. To carry out the adjustments of the parameters was used a glass standard NIST 610, supplied and certified by National Institute of Standards and Technology (NIST). The measurements were carried out on a single spot ablation with low energy density and defocusing, which demonstrated to be the improved way to reach good signal