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## Plutonium coulometry at CETAMA; recent advancement and performance studies

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Abstract topic

Material Control and Accounting

Advancement and challenges in destructive assay techniques

Title: Plutonium coulometry at CETAMA; recent advancement and performance studies

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Controlled Potential Coulometry (CPC) is a primary method for determining plutonium amount content in actinide materials. It reaches high levels of accuracy and is often used to characterize plutonium reference materials in combination with ID-TIMS. As a reference material producer, the CETAMA is currently using this technique to test the homogeneity, the stability and the reference values of plutonium standard solutions, namely the *EQRAIN Pu* and *EQRAIN U+Pu* series. Its performance in terms of trueness and precision was recently assessed for the characterization of pure plutonium nitrate solutions and for mixed uranium-plutonium nitrate solutions with a 100:1 U/Pu ratio. Expanded relative uncertainties are below 0.1% for 5 mg weight samples, which is in full compliance with ITV's 2010 and also consistent with the level of uncertainty of the standards.

Recently, CETAMA participated to an interlaboratory comparison organized by IAEA-NML Seibersdorf and dedicated to plutonium coulometry. The standards were provided as plutonium nitrate dry residue and were analyzed according to our routine procedure except for dissolution, which had to be optimized during test. Concerning trueness, no bias were observed between the mean value of 5 replicates and reference value (Fig. 1). The expanded relative uncertainty was evaluated to be 0.2% for 2 mg weight samples. Results were satisfactory and demonstrated that the CPC method could be considered a reference method for the determination of the Pu mass fraction in plutonium nitrate solid dry residue.

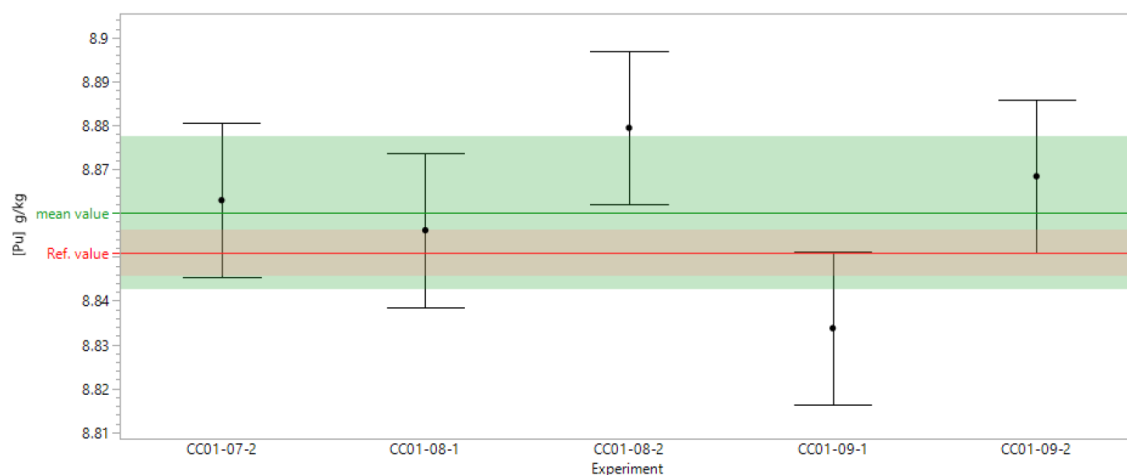


Figure 1 : Plots of the individual results and of the mean value (green solid line) for the determination of the Pu mass fraction in IAEA samples. The coverage intervals of the reference value as well as that of the results (bands) and the reference value (red solid line) are also plotted.