REIMEP-22: Interlaboratory Comparison on U Age Dating

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Prior to the release of a novel uranium Reference Material (IRMM-1000) to be certified for the production date, the EC-JRC-IRMM launched in compliance with ISO 17043 a new Inter-laboratory Comparison REIMEP-22 (Regular European Inter-laboratory Measurement Evaluation Programme) on "U Age Dating - Determination of the production date of a uranium certified test sample" based on this material. (see presentation IAEA CN-218/29 on IRMM-1000)

Participants in REIMEP-22 were asked to take part in two comparisons either on a 20 mg and/or 50 mg uranium certified test sample with an undisclosed value for the production date depending whether they applied a mass spectrometric or a radiometric technique. Based on the use of the natural radioactive decay and disequilibrium of radionuclides from the U-series in the sample, they were asked to measure, using their routine laboratory procedures, the 232Th/234U (compulsory) and 231Pa/235U (optional) amount or activity ratios in a 20 mg or 50 mg uranium certified test sample respectively and report its production date.

In total, 14 laboratories registered for REIMEP-22 with 2 laboratories participating in the two comparisons (20 mg and 50 mg uranium certified test samples)

Finally, 9 laboratories reported results for the 20 mg uranium sample (using spectrometric methods and reporting amount ratios) and 4 laboratories for the 50 mg uranium sample (using radiometric methods and reporting activity ratios).

Four labs reported production dates that agree well with the reference value, so separation of the 232Th from the 234U in the certified test sample was successful.

The other labs either underestimated the uncertainties on the production date or found “younger” ages (perhaps due to an incomplete recovery of the thorium in the certified test sample using their analytical method).

For two labs, reported ratios do not match with the reported production dates, either ratios were not reported for the reference date and/or these labs had problems in calculating the production dates from the average ratio.

Even the Pa/U clock in the IRMM-1000 could be used to determine the production date, although IRMM-1000 will not be certified for this specific clock.

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