USE OF ROBUSTS MEANS ON THE DETERMINATION OF URANIUM FISSION INTERFERENCE FACTOR AND ANALYSIS OF CERFIEDE REFERENCE MATERIALS

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Instrumental Neutron Activation Analysis (INAA) is established as a technique that provides results with high accurate and precision in the determination of several element concentrations in different kinds of matrices. However if the sample contain high U levels problems arise due to U fission product interference. In this study, concentration of Ce, La, Nd and Sm in Certified Reference Materials (CRMs) containing U in their composition were determined by applying the correction due to U fission products interferences and then compared with certified values. Both these factors and the concentration values were obtained using four statistical methods: unweight mean, σ^2 - weight mean, Normalized Residual Method and the Rajeval Test[1-3].

To determine the correct concentration on the CRMs the U fission interference factor for radioisotopes ^{141}Ce, ^{143}Ce, ^{140}La, ^{147}Nd, ^{153}Sm were obtained experimentally and theoretically. The interference factors were determined experimentally by the irradiation of synthetic standards with known masses of these elements for 8 h in a specific position of the IEA-R1 nuclear research reactor. The interference factors were determined theoretically, using nuclear parameters from the literature and the epithermal to thermal neutron fluxes ratio determined in the same position where synthetic standards were irradiated. The obtained value for epithermal to thermal neutron fluxes ratio was 0.01357 ± 0.00022, determined by the irradiation of flux monitors of Au-Al alloy using cadmium ratio technique. In the determination of the U fission interference factors and the epithermal to thermal neutron flux ratio the same statistical methods used on the CRMs analyzes were applied. The best results for these parameters were obtained by the Rajeval method, with high precision in the obtained results.

The CRMs analyzed in this study were irradiated together with known masses synthetic standards inside a same device of irradiation. The results of corrected concentration values obtained applying all of the statistical methods were satisfactory, presenting good *z-score* values, however the present study recommends the value obtained by the Rajeval method based on the best values of the reduced Chi-square, together with high precision in the obtained results.

REFERENCES

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