



Uncertainties Reduction in INAA Application by Using Multivariate Factor Analysis

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Abstract

We performed a preliminary study on the impact of INAA data uncertainties on the performance parameters of the reactor IBR - 2, using R - mode Factor Analysis for gamma-ray spectra pattern recognition and identification of chemical compounds interrelationships. In order to make a comprehensive assessment of the sensitivity and uncertainty of INAA basic and multivariate statistical approaches with the use of co-occurrence and run-length matrices comprised by Factor Analysis are investigated and discussed. Sensitivity and uncertainty analyses have been performed for gamma-ray as considered in the INAA applications. The results obtained on a wide range of classes of factors show that the impact of the assumed gamma-ray data uncertainties is in some cases significant. Our ability to predict important nuclear characteristics and quantify uncertainties in those predictions will be used for large multi-elemental spectra, characteristic in various INAA applications.

Keywords: INAA, R-mode Factor Analysis, correlation matrix, sensitivity, uncertainties