

An Overview of the k_0 -NAA and Application for CRM Matrix Analysis

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The k_0 -standardization method of Neutron Activation Analysis (k_0 -NAA) has been launched in 1975 by Simonits et al. [1]. The method is based on experimentally determined k_0 -factors, which are independent of irradiation condition in an irradiation channel of a nuclear reactor and measuring conditions. This approach greatly reduces the need for the preparation of different standards that should be used in relative methods. Due to well-known characteristics of gold and its applicability in NAA, it is chosen as the standard for k_0 -NAA and all necessary nuclear data of investigating nuclides are normalized to the gold nuclear data. The method has been continuously improving including its nuclear database, so-called k_0 -database [2]. Due to its wide applicability and the possibility of multi-panoramic analysis, the k_0 -NAA has been introduced in many laboratories around the world. At the Jožef Stefan Institute (JSI), the method was introduced in the late 1980s using the 250 kW TRIGA Mark II research reactor and since then has been optimized and validated using different certified reference materials (CRMs) obtained by different producers (NIST, IRMM, BAM, etc.). On this way, the method was established to produce high quality data, which was recognized by producers of new CRMs and we were invited to participate for the certification process of their materials. One example of our collaboration with IRMM (Belgium) for ERM-EF412 Brown coal is shown on Fig. 1. It should be mentioned that the k_0 -INAA is accredited according to ISO/IEC 17025 by Slovenian Accreditation Agency since 2009 (Accreditation Certificate LP-090) for determination of elemental composition in environmental samples. Last but not least the method is used for Key Comparisons (KCs) and Pilot studies (PSs) organized by National Metrology Institutes (NMIs) or Designated Institutes (DIs) coordinating by CCQM IAWG. Successful participation in such studies allow the submission of Calibration and Measurement Capabilities (CMCs) in the BIPM Key Comparison Database (KCDB). Some applications using k_0 -NAA will be presented and discussed.

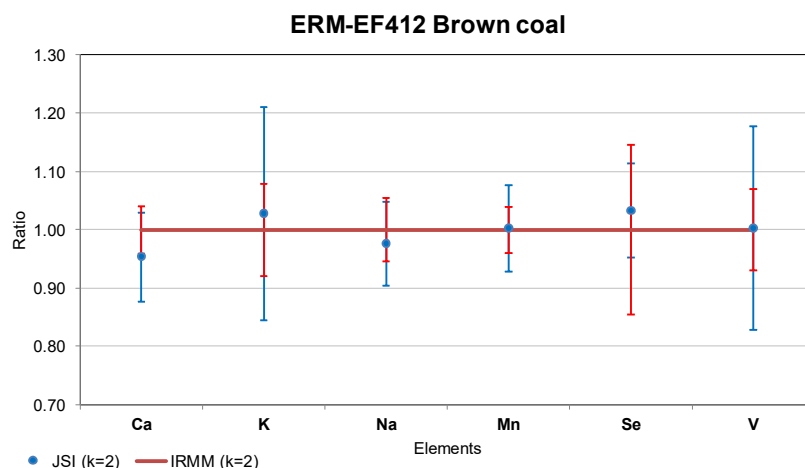


Fig. 1. Comparison of data obtained by k_0 -INAA at JSI with certified values in ERM-EF412 Brown coal.



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