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## Implementation of the k<sub>0</sub>-based Neutron Activation Analysis (NAA) methodology and k<sub>0</sub>-IAEA program at the Centre for Energy Research and Training (CERT), Zaria, Nigeria

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Implementation of the k<sub>0</sub>-standardization method of Neutron Activation Analysis (NAA) technique and k<sub>0</sub>-IAEA program with the Nigeria Research Reactor-1 (NIRR-1) laboratories' irradiation and counting facilities was carried out as part of a series of projects aimed at achieving one of the goals of the Strategic Utilization Plan for NIRR-1. Adoption of the k<sub>0</sub>-standardization method of NAA technique and the k<sub>0</sub>-IAEA gamma-ray spectrum analysis software was due to versatility in meeting the criteria of experimental simplicity, analytical accuracy, and flexibility (with respect to activation and counting conditions). The application of this methodology involved the installation of the k<sub>0</sub>-IAEA software, editing of its permanent database, calibration of HPGe detectors, and characterization of the irradiation facility prior to its use for routine analysis. IAEA (Soil-7) certified reference material was used to evaluate the validity of this method in NIRR-1 NAA laboratories by analyzing the elemental concentrations with respect to the certified values. In general, good agreement was obtained between the results of this work and values in the certificate of the reference material, thus validating the k<sub>0</sub> standardization method of NAA using the k<sub>0</sub>-IAEA program and confirming its suitability for environmental studies in NIRR-1 laboratories.

Keywords: Neutron activation analysis, k<sub>0</sub>-standardization, k<sub>0</sub>-IAEA program, irradiation facility, HPGe detectors.

**Primary author:** Dr ADELEYE, Michael (Bingham University, Nigeria)

**Presenter:** Dr ADELEYE, Michael (Bingham University, Nigeria)

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