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Experimental Performance Evaluation of a Compton Suppression System for Neutron Activation Analysis by Using a Gamma-ray Source and Standard Reference Materials

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A Compton suppression system (CSS) was implemented at a neutron activation analysis laboratory of the Korea Atomic Energy Research Institute (KAERI) in 2009 and its performance was evaluated experimentally by the measurement of a gamma-ray emitting source and of detectable nuclides created by neutron activation with the NIST standard reference materials (SRMs). Four geological and five biological SRMs were chosen and irradiated by using an NAA#1 irradiation hole at the HANARO research reactor. A gamma-ray spectrum with normal mode and anti-coincidence mode were acquired at the same time, and advantage factors of CSS for each nuclide detected were calculated on the basis of signal-to-noise ratio. 531 keV of Nd-147 shows the highest advantage factor, 3.30, from geological samples, and 559 keV of As-76 shows the highest advantage factor, 2.36, from biological samples. The mean AF values for the nuclides detected from four geological and five biological SRMs were 1.99 and 1.63, respectively.

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