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Applicability of k_0 -based neutron activation analysis using a Compton suppression γ -ray spectrometer

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Compton suppression system (CSS) in conjunction with γ -ray spectrometer allows to lower the detection limits for certain elements by reducing the background levels in the acquired γ -ray spectra. The calibration of CSS for use in the k_0 -based neutron activation analysis (k_0 -NAA) has been performed in normal mode and applied to Compton suppression mode. In this case, efficiency data are only applied to radionuclides that emit non-coincident γ -rays. In this work the applicability of the k_0 -NAA method using CSS (k_0 -CSNAA) in Compton suppression mode for radionuclides that emit coincident γ -rays is tested. The SMELS (a synthetic multi-element standard) consisting of nuclides with different γ -ray energy and Q values was used to evaluate the Compton suppression factor for several radionuclides of interest, e.g. ^{60}Co , ^{51}Cr , ^{152}Eu , ^{59}Fe , ^{75}Se , ^{46}Sc and ^{85}Sr . The applicability of k_0 -CSNAA has been tested by analyzing several reference materials, i.e. Coal Fly Ash (NIST-SRM-1633a), Soil (IAEA-Soil-7) and Lichen Material (IAEA-CRM-336). Preliminary results of the test are presented and discussed.

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