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Revisiting the ultimate condition for applicability of k0-NAA: the constancy of neutron flux parameters during irradiation

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In the development of k0-standardized neutron activation analysis (k0-NAA), a number of criteria were identified and worked out both theoretically and practically, that should be taken into account for achieving reliable analysis results. Among these, the ones most frequently considered and reported upon in publications dealing with the implementation and the application of k0-NAA are: i) the choice of accurate input nuclear data (k0-factors; Q0-values; effective resonance energies; half lives etc.), ii) the characterization of the irradiation facility (f - thermal to epithermal neutron flux ratio; alpha - epithermal neutron flux shape factor), and iii) the calibration of the Ge-detector (detection efficiency; peak-to-total ratio). However, a hardly mentioned and indeed often overlooked criterium, which was nevertheless identified to be the ultimate condition and restriction for the applicability of k0-NAA, is the constancy of the neutron flux parameters during irradiation. Therefore, in the present paper this topic is again brought to the attention, not only dealing with theoretical considerations but also considering practical aspects and giving examples taken from the daily practice.

Primary author: Dr DE CORTE, Frans ((em.) UGent and FWO-VL, Neerstraat 20, B-9921 Vinderhoute, Belgium)

Presenter: Dr DE CORTE, Frans ((em.) UGent and FWO-VL, Neerstraat 20, B-9921 Vinderhoute, Belgium)

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