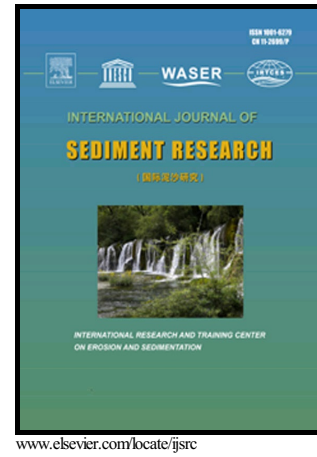


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Esra Uyar, Alptuğ Özer Yüksel, Rufiyet Güven, Haluk Yücel



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**Methodology for determination of correction factors in direct gamma spectrometric measurement of radionuclides in sediments**

Esra Uyar, Alptuğ Özer Yüksel, Rufiyet Güven, Haluk Yücel\*

Ankara University, Institute of Nuclear Sciences, 06100, Tandogan, Ankara, Turkey

\*Corresponding author. Tel: +90 312 212 85 77; Fax: +90 312 215 33 07. E-mail address: haluk.yucel@ankara.edu.tr

## ABSTRACT

In this study, the practical methodologies are described for the determination of the factors for the self-absorption effect ( $F_s$ ), spectral interferences ( $F_{csi}$ ), and true coincidence summing effects ( $F_{coi}$ ), which are used in direct gamma-spectrometric measurement of radionuclides such as  $^{210}\text{Pb}$ ,  $^{238}\text{U}$ ,  $^{234}\text{Th}$ ,  $^{226}\text{Ra}$ ,  $^{214}\text{Pb}$ ,  $^{228}\text{Ac}$ ,  $^{208}\text{Tl}$ ,  $^{214}\text{Bi}$ ,  $^{137}\text{Cs}$  and  $^{40}\text{K}$  in samples. To validate the applied methods, certified reference materials (CRMs) of lake and stream sediments were measured with an n-type Germanium (Ge) detector-calibrated using a multinuclide reference source. The highest self-absorption correction factors ranged from  $F_s=1.44-2.10$  for 46.5 keV peak ( $^{210}\text{Pb}$ ) and  $F_s=1.25-1.60$  for 63.3 keV peak ( $^{234}\text{Th}$ ) lying in the low energy region of the spectrum. The systematic influence was observed for 186.2 keV ( $^{226}\text{Ra}$ ) peak due to spectral interferences with the  $^{235}\text{U}$  contribution. For this peak,  $F_{csi}$  is changed from 0.921 to 0.955. Additionally, the present study suggests that true coincidence summing (TCS) effects are not dominant, except for  $^{208}\text{Tl}$  and  $^{214}\text{Bi}$  for which  $F_{coi}$  ranged from 1.179 - 1.192 and 1.140 - 1.151, respectively.

Keywords:

Correction factor, Self-absorption, Spectral interference, True coincidence summing, Sediment, Gamma-ray spectrometry

## 1. Introduction

In direct measurement of the radionuclides in various samples, high resolution gamma-ray spectrometry (HRGS) is commonly applied since it is a quite easy, rapid, and non-destructive method amongst all

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