

Determination of Isotopic Thorium in Biological Samples by Combined Alpha Spectrometry and Neutron Activation Analysis

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The determination of isotopic thorium by alpha spectrometric methods is a routine practice for bioassay and environmental measurement programs. Alpha spectrometry has excellent detection limits (by mass) for all isotopes of thorium except ^{232}Th due to its extremely long half-life. This paper reports a pre-concentration neutron activation analysis (PCNAA) method for ^{232}Th that may be performed following alpha spectrometry if a suitable source preparation material is utilized. Human tissues and other samples were spiked with ^{229}Th and the thorium was isolated from the sample using ion exchange chromatography. The thorium was then electrodeposited from a sulfate-based medium onto a vanadium planchet, counted by alpha spectrometry, and then analyzed for ^{232}Th by neutron activation analysis. The radiochemical yield was determined from the alpha spectrometric method. Detection limits for ^{232}Th by this PCNAA method are approximately 50 times lower than achieved by alpha spectrometry.

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