Bibliographic Data Sheet **NKS-243**

Title	Method-MS, final report 2010
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ISBN	978-87-7893-315-7
Date	May 2011
Project	NKS-B / METHOD-MS
No. of pages	41
No. of tables	5
No. of illustrations	23
No. of references	49

Abstract

Radiometric determination methods, such as alpha spectrometry require long counting times when low activities are to be determined. Mass spectrometric techniques as Inductively Coupled Plasma Mass Spectrometry (ICP-MS), Thermal Ionisation Mass Spectrometry (TIMS) and Accelerator Mass Spectrometry (AMS) have shown several advantages compared to traditional methods when measuring long-lived radionuclides. Mass spectrometric methods for determination of very low concentrations of elemental isotopes, and thereby isotopic ratios, have been developed using a variety of ion sources. Although primarily applied to the determination of the lighter stable element isotopes and radioactive isotopes in geological studies, the techniques can equally well be applied to the measurement of activity concentrations of long-lived low-level radionuclides in various samples using "isotope dilution" methods such as those applied in inductively coupled plasma mass spectrometry (ICP-MS).

Due to the low specific activity of long-lived radionuclides, many of these are more conveniently detected using mass spectrometric techniques. Mass spectrometry also enables the individual determination of Pu-239 and Pu-240, which cannot be obtained by alpha spectrometry. Inductively Coupled Plasma Mass Spectrometry (ICP-MS) are rapidly growing techniques for the ultra-trace analytical determination of stable and long-lived isotopes and have a wide potential within environmental science, including ecosystem tracers and radio ecological studies. Such instrumentation, of course needs good radiochemical separation, to give best performance.

The objectives of the project is to identify current needs and problems within low-level determination of long-lived radioisotopes by ICP-MS, to perform intercalibration and development and improvement of ICP-MS methods for the measurement of radionuclides and isotope ratios and to develop new methods based on modified separation chemistry applied to new auxiliary equipment.

Key words Long lived radionuclides, ICP-MS, method developement

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