

TECHNETIUM-99 IN COASTAL SEDIMENTS FROM THE IRISH SEA

K. Komura*, M. Yamamoto*, A. Tsumura**, H. Kofuji*,
S. Oikawa*, Y. Kashiwabara* and K. Ueno*

* Low Level Radioactivity Laboratory, Kanazawa University,
Wake, Tatsunokuchi, Ishikawa 923-12, JAPAN

** National Institute of Agro-Environmental Sciences, 3-1-1 Kannondai,
Tsukuba, Ibaraki 305, JAPAN

Environment behaviors of long-lived ^{99}Tc ($T_{1/2} = 2.14 \times 10^5 \text{ y}$) are not revealed well because of its extremely low-level activity in environment. In early days, ^{99}Tc separated from large amount of samples has been measured by low-background β -ray countings, however, recent development of ICP-MS made it possible to measure extremely low-level ^{99}Tc in environmental samples as low as 0.16 mBq (= 0.25 pg) level [1]. In this paper, we will report ^{99}Tc measurement in the coastal area of the Irish Sea contaminated highly with radionuclides discharged from the BNFL Sellafield nuclear fuel reprocessing plant.

Experimental

More than 20 core samples (3cm ϕ x 50-100cm) were collected from the coastal area of the UK facing to the Irish Sea. Weights of the sample are ranging from 300 to 900 g (air-dried bases). Sample was air-dried, pulverized and mixed homogeneously, and before starting radiochemical treatments, non-destructive γ -ray spectrometry was performed to determine ^{137}Cs , ^{241}Am and some other γ -ray emitting nuclides.

In the technetium chemistry for ICP-MS measurement, special care must be taken to remove Mo and Ru, which have stable isotopes with mass number 99 or its vicinity and interfere ICP-MS measurement. Separation procedures of technetium adopted in the present work are composed of 3 stages of solvent extraction by TOA (tri-n-octylamine), MEK (methyl ethyl ketone) and cyclohexanone and final purification by ion exchange using Dowex-1x8 anion exchange resin [1] (Fig. 2). Technetium fraction thus purified was subjected to mass spectrometry of ^{99}Tc by using double-focusing high resolution ICP-MS (HR-ICP-MS).

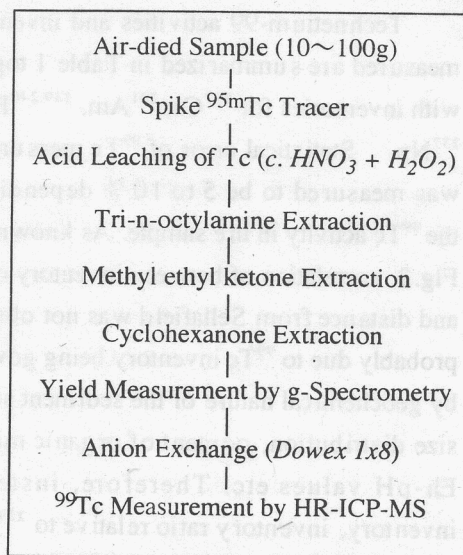


Fig. 1 Outline of technetium chemistry.