

14-13 Contribution to Producing a Certificated Reference Material by AMS MUTSU – Result of an Interlaboratory Comparison by the IAEA –

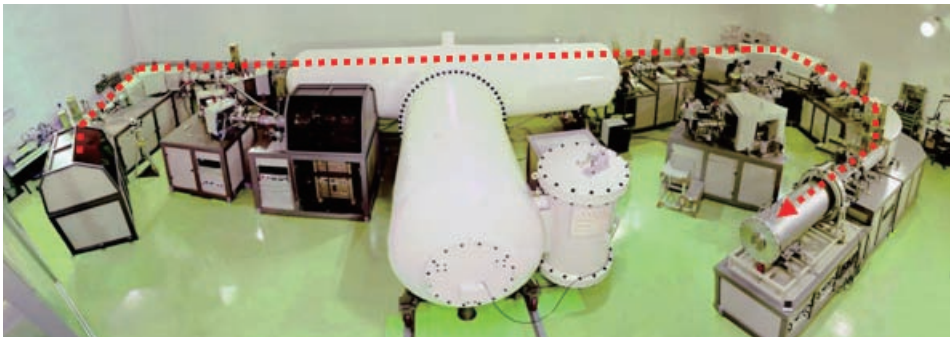


Fig.14-32 The accelerator mass spectrometer at the Mutsu Office, Aomori Research and Development Center, participated in an interlaboratory comparison exercise

This AMS is equipped with two beam lines. The red arrow indicates the beamline for ^{129}I measurement.



Fig.14-33 Iodine extraction from seawater samples

Iodine is extracted from the upper layer (seawater) to the lower organic layer.

Iodine-129 (^{129}I) is one of the long lived radionuclides, and its concentration is quite low in the environment. Due to the quite low concentration of ^{129}I , it is difficult to measure ^{129}I in environmental samples by neutron activation analysis which is known to have good sensitivity for ^{129}I measurement. With the advent of Accelerator Mass Spectrometry (AMS), it is possible to measure ^{129}I in environmental samples. The AMS at the Mutsu Office, Aomori Research and Development Center, was optimized for ^{129}I measurement (Fig.14-32).

The International Atomic Energy Agency - Marine Environmental Laboratories (IAEA-MEL) produces certificated reference materials for accurate and precise determination of radionuclide samples in marine samples. However, IAEA-MEL did not have any certificated reference materials for ^{129}I . For this reason, IAEA-MEL conducted a study to produce new certificated reference material for ^{129}I in seawater samples.

To produce the certificated reference material, it is desirable to use measurements from many laboratories, but there are few laboratories that can measure ^{129}I in seawater

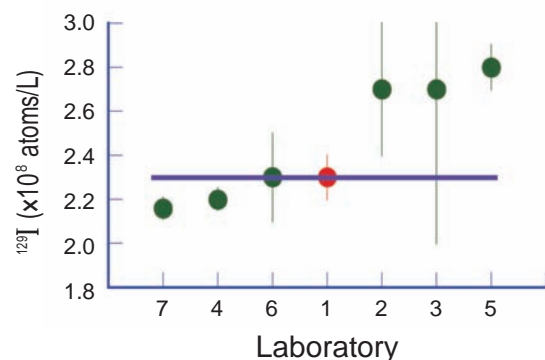


Fig.14-34 Results of the interlaboratory comparison exercise

The red point is the result of AMS MUTSU; the purple line indicates the median.

samples. IAEA-MEL requested measurements from 8 laboratories including AMS MUTSU after sampling in the Mediterranean Sea. We carried out iodine extraction from seawater samples (Fig.14-33) and then measured ^{129}I by AMS three times. The ^{129}I concentration in the sample from AMS MUTSU was obtained to be $(2.28 \pm 0.14) \times 10^8$ atoms/L based on the means and standard deviation from the three results.

In October 2009, IAEA-MEL released all data which were obtained from all participants. The results from 7 of the participants are shown in Fig.14-34. Since the concentration of the samples was determined to be 2.28×10^8 atoms/L, the new ^{129}I certificated reference material was produced by this exercise.

The new ^{129}I certificated reference material would strongly contribute not only to evaluation of the ^{129}I concentration in environmental samples, but can also be used for oceanographic tracers in the geochemical field.

Reference

Pham, M. K., Suzuki, T. et al., Certified Reference Material IAEA-418: ^{129}I in Mediterranean Sea Water, Journal of Radioanalytical and Nuclear Chemistry, vol.286, no.1, 2010, p.121-127, doi: 10.1007/s10967-010-0621-6.