

Development of the technique for determination of I-129 in fish samples as new tracer of marine ecosystem

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The availability of ¹²⁹I as a new tracer for marine ecosystem was examined.

The iodine isotopic ratio (¹²⁹I/¹²⁷I) in seawater is determined by the anthropogenic ¹²⁹I transferred from the atmosphere, i.e., it shows very high ratio as the order of 10⁻¹⁰ for ¹²⁹I/¹²⁷I at the surface or surface mixing layer and suddenly decreases going deeper to some of 10⁻¹² or lower. Iodine isotopic ratio (¹²⁹I/¹²⁷I) of marine lives like fish should be determined by their habitats and the ways exchanging iodine with seawater. This means that the iodine isotopic ratio is potential indicator of marine ecosystem. However there have been only few studies using ¹²⁹I for marine ecosystem. This is because ¹²⁹I is so trace in the marine lives that ordinary analytical techniques cannot detect.

Recent development of analytical technique for ¹²⁹I using AMS (Accelerator Mass Spectrometry) enables determine trace amount of ¹²⁹I concentration in environmental samples.

In this study the pyrohydrolysis method was applied to extract iodine from fish samples. A freeze-dried and homogenized fish sample, 0.1g to 0.5g, was combusted in the quartz tube under oxygen and water vapor flow. Iodine was extracted into an alkaline solution. An aliquot of this solution was taken for ICP-MS analysis to determine the stable iodine (¹²⁷I) concentration. The remaining was, added with carrier iodine (about 1 mg), purified by solvent extraction and collected as AgI precipitation. ¹²⁹I/¹²⁷I ratio was determined by AMS. From the AMS result and the ¹²⁷I concentration, the ¹²⁹I/¹²⁷I ratio of the fish samples themselves can be calculated.

The extraction yield was evaluated using IAEA-414 fish standard sample. Background in the pyrohydrolysis was also examined.

The preliminary results of fish samples, collected from Suruga-bay (located on Pacific coast in the middle of Honshu, Japan) showed 1×10⁻¹⁰ to 7×10⁻¹⁰, which was consistent with that of surface seawater.

Keywords: Iodine-129, tracer, marine ecosystem, fish, AMS