



Speciation analysis of I-127,129 in the crop field soil contaminated by the Fukushima Dai-ichi nuclear power plant accident with newly developed chemical separation techniques

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In previous study, we investigated the depth profile of the accident derived I-129 and downward migration speed in soils of near-field of Fukushima Dai-ichi Nuclear Power Plant, including crop fields and man-made fields. I-129 in soil was measured by AMS and stable iodine (I-127) was measured by ICP-MS at MALT (Micro Analysis Laboratory, Tandem accelerator), The University of Tokyo. It was found that I-129 was concentrated near surface but distributed deeper compared with Cs-137. It was also found that I-129 seems to move downward more quickly than Cs-137.

To investigate the adsorption mechanism and the elemental process of migration of the accident derived I-129 in soil, it is important to know what kind of component the I-129 combines with.

Recent studies on the X-ray absorption fine structure (XAFS), especially near edge structure (XANES), reported that the stable iodine (I-127) in soil existed as an organic component. However, it had not yet been proved that it was also the case with the accident derived I-129 because it had been incorporated in the soil system only recently and the abundance of I-129 in soil was more than 8 orders of magnitude smaller than sub-ppm level stable iodine (I-127).

In this study a progressive sequential extraction method including the dialysis and the dynamic headspace method was newly developed to obtain only the iodine sticking to the soil organic component. The stable iodine can be quantified by direct analysis of the fraction and I-129 can be quantified by AMS method of the fraction added with carrier. The fraction of the organic component for I-127 and I-129 can be evaluated respectively by comparing with the other fraction and/or with the total concentration obtained by the bulk analysis (e.g. by the pyrohydrolysis).