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Speciation of ¹²⁹I and ¹²⁷I in seawater profiles from the Kattegat and Baltic Sea

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Long physical half life, long residence time in the marine environment and continuous releases from nuclear fuel reprocessing plants make ¹²⁹I a suitable tracer for the study of marine geochemical cycle of stable iodine and conversion mechanism of iodine species by speciation analysis of ¹²⁹I and ¹²⁷I. Up to date there are few data on chemical speciation of ¹²⁹I in seawater and no ¹²⁹I chemical speciation analyses in seawater profile was reported. The converting mechanism of iodine chemical species is still unclear.

In the present work, depth profile samples of seawater collected from the Kattegat Belt Sea and Baltic Sea are analyzed for ¹²⁹I, ¹²⁷I as iodide, iodate by using anion exchange chromatography coupled with accelerator mass spectrometry (AMS), inductively coupled plasma mass spectrometry (ICP-MS) respectively.

A relatively high concentration of ¹²⁹I (2-18 x 10¹⁰ atom/L) was found in the Kattegat comparing with that in the Baltic Sea (<2 x 10¹⁰ atom/L). The results show that in the Baltic Sea the concentrations of ¹²⁹I, ¹²⁷I increase with depth and salinity, while the same trend does not occurred in the Kattegat Basin. In Baltic Sea the predominant species of iodine is iodide while in the Kattegat the ratio ¹²⁹I/¹²⁹IO₃⁻ is 1-2. Along the water profile, the atomic ratios of ¹²⁹I/¹²⁷I⁻ and ¹²⁹IO₃⁻/¹²⁷IO₃⁻ decrease from the northern Kattegat to the central Baltic Sea.

Speciation analysis of ¹²⁹I in seawater profile is indispensable for a better understanding of geochemical cycle of stable iodine and the converting mechanism of iodine species in the marine environment.

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