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Iodine - 129 in water samples from Germany

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The natural abundance of ^{129}I has been changed through anthropogenic activities, such as nuclear weapon testing, nuclear accidents and reprocessing of nuclear fuel. Mainly as a consequence of continuous releases of ^{129}I from the nuclear reprocessing facilities in La Hague (France) and Sellafield (UK), ^{129}I is in a state of disequilibrium in all environmental compartments in Western Europe.

It is emitted in gaseous and liquid form, with most of it as liquid waste which flows into the North Sea [1]. From there it is reemitted to and distributed in the atmosphere, and precipitates as wet or dry deposition [2]. In this project we analyse precipitation samples from 10 sampling locations and river water samples from 15 sampling locations all over Germany. The concentrations of ^{129}I and ^{127}I are determined, as well as their isotopic ratio.

Iodine is extracted from the water by ion exchange resin. ^{127}I is analysed using inductively-coupled plasma mass spectrometry (ICP-MS) and the isotopic ratio is determined via accelerated mass spectrometry (AMS). Results of the ^{127}I analyses reveal slightly higher concentrations for the river water samples (1.7 to 15.9 ng/g) than for the rain water samples (0.6 to 9.8 ng/g). Concentrations of ^{129}I range between 17 to 2000 fg/kg (rain water) and between 17 to 350 fg/kg (river water), respectively. For the precipitation samples ($14 \cdot 10^{-9}$ to $650 \cdot 10^{-9}$), as well as for the river water samples ($3 \cdot 10^{-9}$ to $40 \cdot 10^{-9}$), the $^{129}\text{I}/^{127}\text{I}$ ratios are at least 3 orders of magnitude higher than the natural equilibrium isotopic ratio of $1.5 \cdot 10^{-12}$ [2].

[1] J.M. Gómez-Guzmán et al. (2012) *Atmospheric Environment* 56, 26-32. [2] R. Michel et al. (2012) *Science of the Total Environment* 419, 151-169.

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