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A Rapid Method for ^{236}U Determination in Seawater

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An automated analytical method implemented in a flow injection (FI) system was developed for rapid determination of ^{236}U in 5-10 L seawater samples. After a quick iron hydroxide co-precipitation, extraction chromatography (UTEVA) was exploited to separate and purify target analytes, whereupon ^{238}U was used as a chemical yield tracer. Accelerator mass spectrometry (AMS) was applied for quantifying the $^{236}\text{U}/^{238}\text{U}$ ratio and inductively coupled plasma mass spectrometry (ICP-MS) was used to determine the absolute concentration of ^{238}U in the original seawater, thus the level of ^{236}U can be calculated. The co-precipitation behaviour of uranium with iron hydroxide was studied and optimized for the sample pre-treatment as well as for the target preparation prior to AMS measurement, respectively, in order to achieve high chemical yields. The analytical results indicate that the developed method is simple and robust, providing satisfactory chemical yields (70-100%) and relatively short analytical time (4 h/sample). Based on the developed method, seawater samples collected along the Danish coast were analyzed and the distribution characters of ^{236}U were discussed.

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