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Determination of ultra-trace level of Pu isotopes in seawater sample using multi collector inductively coupled plasma mass spectrometry (MC-ICP-MS)

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A method is presented for the preparation of environmental materials (seawater) and their accurate analysis, by multiple collector magnetic sector ICP-MS, for the isotopic composition of Pu. Pu isotopes concentration is extremely low and U (uranium)/ Pu ratio is quite high, analysis of Pu in the environmental seawater sample demands highly sensitive instrument and an efficient U separation process. A multi collector inductively coupled mass spectrometry (MC-ICP-MS) is an ideal instrument in the quantitative and qualitative analysis of Pu isotopes (239Pu, 240Pu, 241Pu) in the seawater. Mixed HF (0.01M) and HCl (0.6M) as an eluent showed high recovery for Pu in the 1st and 2nd TEVA separation and also contributed high signal intensity by washing out effect in the sample inlet pathway before plasma. Additionally X-cone in the skimmer and Jet sampler cone combination dramatically increased Pu signal by a factor of 2~3. Detection limit and precision for Pu isotopes determination were compared at three different seawater amounts (5 kg, 15 kg and 25 kg) in the three depth groups (surface, 200 m+500 m, 750 m+1000 m) to determine practical sampling amounts for surface and deep sea water.

Biography

Inhee Choi completed her PhD in Chemistry. Currently, she is working at Korea Institute of Nuclear Safety (KINS) as a Senior Researcher in the field of "Analysis of long-lived radioactive isotopes in environmental samples using MC-ICP-MS combined with chemical separation purification".

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