

Determination of uranium in liquid samples

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Abstract

Uranium is a natural occurring radionuclide and the first member of natural radioactive chains which makes its determination in natural materials interesting from geochemical and radioecological aspect. It can be quantitatively determined as element and/or its radioisotopes by different spectrometric methods (ICP-MS, spectrophotometry, alpha spectrometry). It is necessary to develop inexpensive, rapid and sensitive methods for the routine analysis. Therefore, in this paper, development of a new method for the isolation of uranium from liquid samples and subsequent determination by spectrophotometry and ICP-MS will be described. It is possible to isolate uranium from drinking and seawater using extraction chromatography or mixed solvent ion exchange. Uranium can be strongly bound on the TRU extraction chromatographic resin from nitric acid (chemical recovery is 100%) and can be separated from other interfering elements, while separation from thorium, which can be also strongly bound on this resin, is possible with hydrochloric acid. It is also possible to separate uranium from thorium on the anion exchanger Amberlite CG-400 (NO₃⁻ form) because uranium is much more weakly bound on this exchanger from alcoholic solutions of nitric acid. After the separation uranium is determined by ICP-MS and by spectrophotometric method with arsenazo III (λ_{\max} =652 nm). Developed method enables selection of the optimal mode of isolation for the given purposes.

KEYWORDS: *uranium, thorium, TRU resin, ICP MS, spectrophotometry*

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