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# Uranium-Isotopes in Austrian Groundwater measured by QQQ-ICP-MS and Alphaspectroscopy

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The Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology funded a monitoring project of the current status of the activity concentration in Austrian groundwater. Measurements of uranium-isotopes (U-238, U-235 and U-234) were part of this project.
The uranium isotopes concentration was determined using two different analytical methods - inductively coupled plasma mass spectrometry (ICP-MS) and alpha-spectrometry as reference method. To increase the detection limit for U-234 measured by ICP-MS a concentration step was conducted.
This concentration step bases on the already existing, in house validated method Separation of Natural Radionuclides Ra-226, Ra-228, Pb-210, Po-210 in water to get an overall method. This method involves after evaporation, the separation into a Pb-210, Po-210 fraction by sulfate precipitation and a Ra-226, Ra-228 fraction. The chemical recovery is determined by ICP-MS using an added amount of Pb++ and Ba++. The process is followed by two separate measurements with LSC. Uranium isotopes are located in Pb/Po fraction- they are co-precipitated mainly by adsorption and are usually removed by washing the precipitate with nitric acid. This solution was collected and used to determine uranium isotopes. We were able to get a concentration factor of 20 and remove parts of the matrix. We were able to achieve a concentration factor of 20 and remove interfering matrices. U-235 was used to calculate a recovery factor for uranium 234. The details of the method development and the reference measurements with alpha spectrometry will be presented.

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