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Accelerator mass spectrometry of uranium: comparison of U₃O₈ and UF₄ target matrices

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For determination of ²³⁶U/²³⁸U ratios in environmental samples by accelerator mass spectrometry, the U₃O₈ targets are usually used for the UO⁻ beam production. Uranium fluoride targets containing no oxygen and hydrogen may offer higher molecular isobar suppression together with a higher accuracy and sensitivity of uranium isotope analysis¹. However, the preparation of anhydrous UF₄ targets is more complicated than the preparation of U₃O₈ targets. When introducing inert atmosphere into the dehydration step of the preparation the only partial reduction of oxygen and hydrogen content in the final product of the preparation method was assured. In this work, several U₃O₈ and UF₄ targets were tested in the CENTA laboratory using the MC-SNICS ion source and double focusing injection magnet and the targets were prepared using the Vienna KKU standard with ²³⁶U/²³⁸U isotopic ratio of 10⁻¹¹. The detailed study of anhydrous UF₄ preparation method will be performed in CTU laboratories. The ion current from only one UF₂⁻ sample was in average higher by about 50 % than the UO⁻ current from the U₃O₈ samples. The targets were completely sputtered away, and the estimated ionization yields of UO⁻ and UF₂⁻⁻ were of the order of 10⁻³. However, with the improved procedure of the UF₄ targets production, we expect that even higher ionization yields could be obtained.

REFERENCES

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