Methods and objects of chemical analysis, 2015, Vol. 10, No. 1, 5–10

Analysis of Elemental and Isotopic Composition of Uranium Ore Concentrate Using LA-ICP-MS

D.V. Kutnii*, S.A. Vanzha, V.V. Levenets

National Science Center "Kharkov Institute of Physics and Technology" NAS of Ukraine, 1, Akademichaskaya St., Kharkov, Ukraine, 61108; *e-mail: d_kutniy@kipt.kharkov.ua

Recieved: February 12, 2015; Accepted: March 20, 2015

Uranium concentrate is a product of hydrometallurgical processing of uranium ore in form of mixture of oxides with general chemical formulae U_3O_8 which is the basis for the production of nuclear fuel. The work presents the results of study on direct determination of elemental and isotopic composition of uranium ore concentrate using laser ablation inductively coupled plasma mass-spectrometry (LA-ICP-MS). It is shown that the obtained data on isotopic composition of ^{234}U, ^{235}U, ^{236}U, ^{238}U is well matched with data of gamma-spectrometric measurements and thermal ionization mass-spectrometry, and ratio of $^{235}U/^{238}U$ isotope composition is close to the one observed in nature, 0.00725. Concentrations of major impurities in the range of atomic mass units from 10.811 (B) up to 232.038 (Th) were determined. It is demonstrated that the results of elemental analysis of uranium ore concentrate are well matched with literature data for the majority of the analyzed elements.

Keywords: uranium ore concentrate, mass-spectrometry, laser ablation, isotopic composition, elemental composition