Contribution ID: **545** Type: **POSTER**

Determination of the metallic and oxide compounds in models based on metallic uranium containing uranium dioxide, metallic neodymium, cerium as well as neodymium and cerium oxides

Thursday 21 April 2022 13:40 (2 hours)

To determine uranium in the metallic phase in the presence of uranium oxide there is a reliable, so-called "bromine method", which implies a metallic-oxide mixture treating in the bromine ethyl acetate solution. However, analogous manipulations with rare earth metals and their oxides do not provide such reliable data. Reduction melting of oxides in a graphite crucible with the melt composed of additional metals is another method, which allows determining the total amount of oxygen bonded in the sample. Together with the common chemical analysis of desired elements and using two aforesaid methods we obtain an algorithm of definite manipulations that provide the relation of metallic and oxide phases of different metals in the samples under study. In the present case, the "bromine"method provides reliable data on the metallic uranium and uranium dioxide, i.e. oxygen bonded to uranium. At the same time, the reduction melting method provides information on the total oxygen concentration in the sample under study, which allows calculating the amount of oxygen on every atom of the rare-earth metal considering the data on the amount of oxygen bound to uranium.

The suggested algorithm of the chemical operations was verified using model mixtures, in which various combinations of metals (U, Nd, Ce, and metallic Pd) and their oxides (U, Nd, Ce) were used. The mixtures composed of the known amounts of various substances were used as samples. Metallic uranium served as a basic component (85-95 wt.%). The experimental results were in good agreement with the theoretically obtained values on the concentrations of metallic uranium, neodymium, cerium, and their oxides.

Country/Int. organization

Russian Federation

Authors: Mr SHISHKIN, Alexei (Institute of High Temperature Electrochemistry of the Ural Branch of the Russian Academy of Sciences); Dr SHISHKIN, Vladimir (Institute of High Temperature Electrochemistry of the Ural Branch of the Russian Academy of Sciences); Mrs MAMONOVA, Natalia (Institute of High Temperature Electrochemistry of the Ural Branch of the Russian Academy of Sciences); Ms BURDINA, Anna (Institute of High Temperature Electrochemistry of the Ural Branch of the Russian Academy of Sciences); Prof. ZAIKOV, Yury (Institute of High Temperature Electrochemistry of the Ural Branch of the Russian Academy of Sciences); Dr CHO, Young-Hwan (Korea Atomic Energy Research Institute)

Presenter: Prof. ZAIKOV, Yury (Institute of High Temperature Electrochemistry of the Ural Branch of the Russian Academy of Sciences)

Session Classification: Poster Session

Track Classification: Track 3. Fuels, Fuel Cycles and Waste Management