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## Development experience and concept of analytical support complex for industrial-scale fast reactor fuel production

Requirements imposed to nuclear fuel in terms of stoichiometric composition and chemical purity are rather high and depend on the technical and operating conditions of fuel rods in a nuclear reactor.

RIAR has long operating experience with the production facility for granulated mixed nuclear fuel (MOX fuel) using electrolytic precipitation of uranium and plutonium oxides from molten chlorides of alkaline metals which are subsequently used for fabrication of vibropacked fuel pins. In connection with this RIAR has developed, metrologically certified and uses a set of analytical procedures, which ensure process control, certification of the obtained fuel and analysis of intermediate process products, waste and environmental objects for the content of uranium, plutonium and transplutonium elements.

Analytical control of the pyrochemical mixed fuel production process is performed by periodic analysis of the molten alkali metal chloride samples for the content of uranium, plutonium, americium and lead. The procedures are used for direct spectrophotometric determination of uranium and lead, alpha spectrometric determination of plutonium and analysis of the above elements with the preliminary extraction-chromatographic separation.

Each batch of the manufactured MOX fuel is subject to certification including determination of the mass portion of uranium, plutonium, americium, chlorine, fluoride, carbon, moisture, cation impurities and nuclide composition of uranium and plutonium, oxygen coefficient (O/M ratio) and bulk granulate density.

The set of procedures listed above has been successfully used at RIAR for more than 25 years and addresses the technical requirements imposed on final products.

The paper describes the procedures developed at RIAR and proposes the ways of their updating and adaptation for modern equipment.

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