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NEW ASPECTS OF THE MECHANISM OF HYDROGEN EFFECT ON SPENT FUEL DISSOLUTION

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Our experimental data indicate that the hydrogen effect is a complex phenomenon and has several aspects. The decomposition of hydrogen peroxide on the surface of SIMFUEL is followed by the reaction of the produced hydroxyl radicals with hydrogen to give water, or their reaction with H_2O_2 to give O_2 . Only a very small part of the initial hydrogen peroxide ($<0.02\%$) causes oxidative dissolution of the SIMFUEL producing U(VI) in solution.

In another study, the leaching of a high Pu content ($\sim 24\%$) un-irradiated MOX fuel was investigated under anoxic conditions (Ar) and in the presence of 1 MPa $D_2(g)$. The results obtained under 1 MPa deuterium indicate a complete absence of oxidative dissolution during the first 29 days. Isotopic D/H analysis of the water sampled in the autoclave and analysis of the gas atmosphere of the autoclave makes possible to draw conclusions about the fate of radiolytic oxidants.

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