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Hydrogen Embrittlement and Corrosion Behavior of Uranium-Molybdenum Nuclear Fuels

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ABSTRACT

The hydrogen embrittlement and corrosion behavior of gamma uranium molybdenum nuclear fuels via hydrogen and its relation to the fragmentation arc analyzed. Absorption of hydrogen on the metallic fuel matrix and other uranium phases is currently being explored for the production of powders of 1-U Mo nuclear fuels, in dispersion type fuel elements for research reactors. The resistance of the alloys in oxidizing atmospheres is also a major concern, in the steps of alloy and powder production. The experiments were carried out with samples of 1-U Mo alloys in the range of 5 to 10% wt. Mo additions. Thennal treatments were performed under a constant flow of hydrogen and oxygen, subjected to several thermal cycles, in a thermo-gravimeter analyzer and in a semi-pilot process unity. From the results of oxidation, there is an indication that the reaction susceptibility of the alloys is a function of the composition. It was observed from the results of hydrogen incorporation, as a function of temperature and time, that fragmentation is possible under specific conditions, for each Mo addition, ranging from a collapse of the structure. to the presence of superficial cracks. However, a drastic behavior was observed during quenching in all compositions, when stable behavior under hydrogen passes to a total collapse of the structure.