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Drop Calorimeter studies on U-7Mo and U-10Mo alloys

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Uranium metallic alloys are candidates for the next generation of nuclear fuels in some reactor projects. To stabilize the BCC gamma phase, some alloying elements like Mo are added. The addition of Mo can lead to the precipitation of the eutectoid phase U2Mo through the decomposition of the gamma phase. This work studied the decomposition of the gamma phase in the U-7Mo and U-10Mo alloys, after hot rolling followed by water quenching, through drop calorimetry and X-ray diffraction. Samples of both alloys were dropped in the temperature range of 473 to 1023K in 100K steps. After the drop, the samples remained in the calorimeter furnace to observe off-peak phase transformations. The DC results also made it possible to calculate the Thermal Capacity under constant pressure (Cp) for both alloys. The enthalpy curve for both alloys does not present discontinuities, indicating that does not occur any fast phase transformation, but the heat flow curves indicate that both alloys undergo an exothermic phase transformation in the 673 to 773K temperature range. The X-ray diffraction results show that the gamma phase has decomposed to alpha + U2Mo in the 673 to 773K samples. Besides the Mo content, the Cp of both alloys presented no significant difference.