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THERMAL EXPLOSION IN A 3NI+AL POWDER MIXTURE PRELIMINARY ACTIVATED IN A LOW-POWER MILL

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Mechanical activation (MA) of a reaction system is an effective method to control a chemical transformation. Despite the long-term practical use of MA, the consistent study of mechanochemical reactions was developed only in the 20th century. The reason for this is the complexity of the phenomenon, the study of which requires knowledge of the physics, chemistry, and mechanics of condensed matter. Another reason is the lack of reliable and accurate tools and techniques for the direct study of chemical reactions under conditions of intense dynamic loads. Therefore, most of the current knowledge about mechanochemical reactions has been obtained indirectly. At present, the mechanical method of activation of chemical transformations is used to stimulate various solid-phase reactions [1–5].

In this work, experimental results are presented that reflect the effect of the parameters of preliminary MA on the temperature-time characteristics of the synthesis of the Ni_3Al intermetallic compound.

It is shown that preliminary MA promotes an increase in the reactivity of the mixture due to the formation of a developed interfacial surface in it and an increase in the reserve of excess energy contained in structural defects. It was also found that the mild conditions of MA of the initial powder mixture in a low-energy mill make it possible to avoid the effects of its deactivation.

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