HEAT OF EXPLOSION AND ACCELERATION ABILITY OF MIXTURES OF HIGH EXPLOSIVES WITH TITANIUM AND TITANIUM HYDRIDE

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Abstract: The aluminum powder is often used as a component of explosive materials. However, there are some substances that can compete with aluminum. One of these substances is titanium. The evaluation of the potential energy content was performed for the HMX-based compositions containing aluminum, titanium, and titanium hydride. Furthermore, the calorimetric measurements of the heat of explosion (HoE) were carried out. From the data obtained, it follows that the additives considered increase HoE of HMX. However, the measured HoE value is only a part of the potential energy content. The mixtures with micro- and nanosized aluminum are superior to the compositions with titanium and titanium hydride in HoE. The smallest HoE values correspond to the mixtures with titanium hydride; however, these compositions form the greatest number of moles of gaseous products. The acceleration ability (AA) was measured with the use of the method known as M-40 (acceleration of a steel plate from the end of a charge inside the thick-walled steel shell). From the results, it follows that the addition of aluminum, titanium, and titanium hydride enhances AA of HMX as well as of the powerful mixture HMX/bis(trinitroethyl)nitramine. The close values of AA correspond to the mixtures containing aluminum and titanium. The compositions with titanium hydride are inferior to the mixtures with aluminum and titanium in AA.

Keywords: high explosive; heat of explosion; acceleration ability; aluminum; titanium; titanium hydride

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References


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