

Investigation of the properties energy compositions such as ammonium nitrate/polymer and ammonium nitrate/fuel-binder

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Abstract

Research and development of energy compositions based on ammonium nitrate is an important task in the field of high-energy materials creation. Compositions of this type differ low sensitivity to various influences, ecological purity of combustion products and low cost. There are a number of problems that inhibit the widespread distribution of energy compositions based on ammonium nitrate in various technical applications. One of such problems is low efficiency of combustion of nitrate compositions caused by bad flammability, low burning rate and big losses on underburning. This article proposes ways to solve this problem. Two types of materials obtained from the solution are considered: ammonium nitrate/polymer and ammonium nitrate/fuel-binder, filled with dinitramida salts. In the studies the ratio of components in these materials and their physical condition (monolith, powder, crumb) varied. The research of parameters of combustion in conditions of a gauge bomb, sensitivity to thermal and mechanical influences of energetic compositions of various formulation and physical condition are carried out. Studies have shown that cocrystals on the basis of ammonium nitrate are characterized by the best flammability and higher combustion rate, in comparison with the mechanical mixtures of similar composition, the introduction of salts dinitramida in compositions type ammonium nitrate/fuel-binder on the influence on the parameters of ignition and combustion in some cases more effectively than the introduction of nanodisperse powder aluminum. Studies of sensitivity to mechanical and thermal effects in together with the literary data shows high efficiency of cocrystallization of components, application of fuel-binder on the basis of nitrotriazole plasticizer, salts dinitramida in terms of creation compositions with parameters at the level of compositions of type HTPB and NEPE. The proposed ways of obtaining energy compositions allow to receive new functional materials and modified components for gas-produced applications and other technical systems.

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