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Critical features and some properties polymer compositions containing high-dispersal hexanitrohexaazaizowurcitan

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Abstract

The use of hexanitrohexaazaizowurcitan can in mixed energy compositions based on various polymer binders faces a number of problems caused by the specific properties of this component: resistance under normal conditions most polymorphic modifications of the crystalline product, the difficulty of obtaining a crystalline product of the required dispersal and polymorphic modification, re-crystalization and remodification of the product in polymer mixtures compositions, increased ability to form crystals with most traditional components of energy compositions. Relatively low and selective, in comparison, for example, with compositions based on octogen, the increase in energy efficiency when using hexanitrohexaazaizowurcitan in energy compositions with polymer binders of different nature, puts forward the task of simultaneously addressing the issues of reducing energy losses when burning energy compositions in energy installations of various purposes. The solution of these issues is associated with the use of high-dispersal and nanoscale fillers in the compositions of mixed energy materials.

For the use of hexanitrohexaazaizowurcitan in compositions, along with the problem of choosing a polymer binder, solving the issues of obtaining a crystal product required modification and different variance, including nanoscale, experimental research is needed: critical characteristics of filling polymer compositions (maximum degree of filling; filling corresponding to percolation transitions), their effect on basic properties energy compositions – characteristics of combustion, physical-mechanical and explosive characteristics, physical and chemical stability of properties, etc.; to assess the prospects of using alternative compositions based on the co-crystalyzates of hexanitrohexaazaizowurcitan with other components of mixed compositions.

Taking into account the above and in the development of earlier works, the article provides some results of the definition of critical volume – maximum and critical for the formation of percolatin cluster – degrees of filling polymer compositions with inert hexanitrohexaazaizowurcitan powders of varying variances, including high-dispersal and nanoscale. In addition, data on the relationship of critical characteristics with the characteristics of combustion, physical-mechanical, rheological characteristics of compositions are presented. Data on the effect of high-dispersal and nanoscale powders of hexanitrohexaazaizowurcitan on shock-wave sensitivity of samples of mixed energy materials are presented. The results of tests of alternative homogeneous energy compositions based on the co-crystalyzates of hexanitrohexaazaizowurcitan with a brief analysis of the prospects of their use are also presented.

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