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Influence of dispersion and polymorphic modification on explosive characteristics, thermal decomposition and combustion of CL-20 and composite power materials on its basis

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Abstract

In article results of the analysis influence dispersion, including highly dispersive and nanodimensional powders, and polymorphic modifications of a hexanitrohexaazaisowurtzitane (CL-20) on explosive characteristics, thermal decomposition, burning rate and other properties of compositions are given in its basis. CL-20 (density, to an education enthalpy, an oxidation potential) surpasses such nitramines as hexogen and octogen in the power mass characteristics. However, CL-20 are inherent specific features of interaction with the majority of polar polymers, softeners and other components of the composite power materials (CPM) which complicate development, a research of properties and application of compositions with use of CL-20. It is so far established that binding on the basis of divinyl polymers are a basis of perspective compositions with CL-20. Use of such softeners, binding at the right choice, formation of complexes and cocrystals ensures safety of the polymorphic modification of CL-20 used in compositions, blocking that allows to create CPM compositions suitable for the long-lived operation.

As objects of a research the powders CL-20 of different dispersion, different polymorphic modifications received with use of methods of a crystallization without and with after-treatment by mechanical and ultrasonic influences, and also compositions on their basis are chosen. As binding the analog of polydivinyl binding (HTPB type) potentially providing required level of chemical compatibility of components, lack of polymorphic transformations and formation of complexes and cocrystal of CL-20 is chosen at manufacture and storage of compositions. The submitted data confirm lack of significant interaction of CL-20 with components of polydivinyl binding HTPB with preservation of polymorphic modification, slight solubility and lack of formation of complexes or cocrystal. After-treatment of the highly dispersive powders CL-20, transition to nanodimensional particles and molecular dispersions of CL-20 to binding allows to reduce the level of burning rate of compositions, and also to increase their safety as a result of decrease in sensitivity to mechanical influences and increases in a threshold of shock and wave sensitivity.

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