Full Paper _____ *Thematic Section:* Research into New Technologies.
Reference Object Identifier – ROI: jbc-01/18-55-9-58 *Subsection:* High Energy Substances.
The Digital Object Identifier – DOI: 10.37952/ROI-jbc-01/18-55-9-58
Submitted on July 10, 2018.

Features of some methods of obtaining ultra-and nanodisperse powders hexanitrohexaazaisowurtzitane, explosive properties of powders and compositions on their basis

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Keywords: hexanitrohexaazaisowurtzitane, dispersion, ultrasonic spraying, mechanical impact, cocrystal, shock-wave sensitivity, sensitivity to mechanical influences.

Abstract

The results of the analysis of the peculiarities of obtaining ultra- and nanodisperse powders hexanitrohexaazaisowurtzitane (HNIW, CL-20) are presented by methods of ultrasonic dispersion of its solutions, mechanical modification in the friction installation, and also destruction of cocrystals. It is shown that these methods allow obtaining a wide range of required particle sizes. As a result of application of these methods the agglomerated product requiring additional treatment for destruction of agglomerates is obtained. Application of concentrated suspensions HNIW in water or water-etanole environment allows to receive at use of a friction installation blocks product even at unfavorable initial bipiramidalnoy form of particles with preservation of polymorphic modification. It is established, that at ultrasonic dispersion of solutions HNIW in volatile solvents spherical agglomerates in diameter more than several microns from nanoscale particles contain large emptiness. Agatirovannaya surface of some spherical agglomerates is caused, apparently, by processes of recrystallization at absorption of vapors of a solvent. For destruction of agglomerates it is suggested to use ultrasonic influence on water or water-etanole suspension at low concentration of agglomerated product. The method of obtaining ultra- and nanodisperse powders HNIW destruction of its cocrystals with solvents is supplemented by destruction of molecular complexes HNIW with polar polymers. If the product is allocated from the destroyed complex HNIW/polymer it is expedient to use soluble in precipitators (water, etanole, etc.) polymers. The explosive properties of some of the product samples obtained by different methods are analyzed. Additional processing of the product received by ultrasonic dispersion with destruction of agglomerates allows to reduce its sensitivity to impact and friction of shock character in ~2 times. The standard methods tested shock wave sensitivity of model compositions on the basis of HNIW, obtained by different methods. It is shown, that replacement of a part of microdispersed HNIW on ultra- and nanodispersed allows to raise a threshold of shock-wave initiation of detonation of samples from 1.2-1.5 GPa to 1.9-2.1 GPa. The carried out works confirm necessity of use of multistage processes for reception of ultra- and nanodispersed HNIW.

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