EFFECT OF PROPERTIES OF HMX PARTICLES ON COMBUSTION-TO-EXPLOSION TRANSITION IN SEMICONFINED VOLUME

A. A. Matveev, V. N. Kulikov, A. N. Osavchuk, N. I. Shishov, and A. A. Kozlov

FSUE "Federal Center for Dual Technologies "Soyuz", 42 Acad. Zhukova Str., Dzerzhinsky, Moscow Region 140090, Russian Federation

Abstract: The process from combustion to explosion or detonation transition in powder explosives always attracts attention of researches. This paper presents the results of experimental studies of the abovementioned process in HMX at its ignition in tubes open at one end depending on its particle properties — size, shape, and covering with different materials.

Keywords: HMX powder; transition of combustion to explosion; semiconfined volume

References

1. Belyaev, A. F., V. K. Bobolev, A. I. Korotkov, *et al.* 1973. *Perekhod goreniya kondensirovannykh sistem vo vzryv* [Transition of condensed combustion systems to explosion]. Moscow: Nauka. 292 p.
2. Ermolaev, B. S., V. A. Foteenkov, B. A. Khasainov, A. A. Sulimov, and S. E. Malinin. 1990. Critical conditions for the passage from combustions into explosion in granular explosive materials. *Combust. Explo. Shock Waves* 26(5):590–597.
3. Nishpal, G. A., Yu. M. Milekhin, L. A. Smirnov, A. N. Osavchuk, and E. G. Gusakovskaya. 2002. *Teoriya i praktika vzryvobezopasnosti energoemkikh materialov* [Theory and practice of energy-intensive materials explosion safety]. Moscow: Khimmash. 113 p.
4. Kulikov, V. N. 2009. Razrabotka kriteriev modelirovaniya i otsenki sklonnosti k perekhodu goreniya vo vzryv poroshkoobraznykh vzryvchatykh veshchestv v poluotkrytom ob"eme [Development of criteria for modeling and assessment of tendency of combustion-to-explosion transition of powdered explosives in a semiopen volume]. *Boepripasy i vysokoenergeticheskie kondensirovannye sistemy* [Ammunition and High-Energy Condensed Systems] 1:60–68.
5. Merkulov, V. M., V. N. Kulikov, A. N. Osavchuk, and T. A. Bestuzheva. 2010. Kriticheskie usloviya perekhoda goreniya geksogena vo vzryv v poluotkrytom i zakrytom ob"eme [Critical conditions for the transition of RDX combustion to explosion in semiopen and closed volume]. *Uspekhi v spetsial'noy khimii i khimicheskoy tekhnologii: Trudy Vseross. nauchn.-tekhnich. konf.* [Advances in Special Chemistry and Chemical Technology: All-Russian Scientific and Technical Conference Proceedings]. Moscow. 381–386.
6. Kulikov, V. N., A. A. Matveev, and A. N. Osavchuk 2012. Kriticheskie usloviya perekhoda goreniya poroshkoobraznykh vzryvchatykh materialov vo vzryv v poluotkrytom ob"eme [Critical conditions for combustion-to-explosion transition of powdered explosives in a semiconfined volume]. *Goren. Vzryv (Mosk.) — Combustion and Explosion* 5:248–254.

Received May 28, 2016

Contributors

Matveev Aleksey A. (b. 1956) — Doctor of Science in technology, vice-director, FSUE "Federal Center for Dual Technologies "Soyuz," 42 Acad. Zhukova Str., Dzerzhinsky, Moscow Region 140090, Russian Federation

Kulikov Victor N. (b. 1945) — Candidate of Science in technology, leading research scientist, FSUE "Federal Center for Dual Technologies "Soyuz," 42 Acad. Zhukova Str., Dzerzhinsky, Moscow Region 140090, Russian Federation; fcdt@fc-soyuz.ru

Osavchuk Alexander A. (b. 1949) — Candidate of Science in technology, head of laboratory, FSUE "Federal Center for Dual Technologies "Soyuz," 42 Acad. Zhukova Str., Dzerzhinsky, Moscow Region 140090, Russian Federation

Shishov Nikolai I. (b. 1946) — Doctor of Science in technology, Head of Department, FSUE "Federal Center for Dual Technologies "Soyuz," 42 Acad. Zhukova Str., Dzerzhinsky, Moscow Region 140090, Russian Federation; fcdt@monnet.ru

Kozlov Andrey A. (b. 1991) — leading engineer, FSUE "Federal Center for Dual Technologies "Soyuz," 42 Acad. Zhukova Str., Dzerzhinsky, Moscow Region 140090, Russian Federation