

## ACCELERATION ABILITY OF ALUMINIZED EXPLOSIVE COMPOSITIONS

M. N. Makhov

N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation

**Abstract:** The results of investigations have confirmed the possibility of enhancing the acceleration ability (AA) of high explosives (HEs) by addition of dispersed aluminum (Al). In the case of the formulations prepared by mechanical mixing, the compositions containing nanoaluminum (nAl) and Al with the particle size of the order of several micrometers have close values of AA. It follows from the comparison of the calculation results and the experimental data that the nanocomposites representing the systems with uniform distribution of nAl particles in HE matrix can be superior in AA to the mechanical mixtures when basic HE has highly negative oxygen balance.

**Keywords:** high explosive; acceleration ability; aluminum; nanocomposite

### References

1. Orlenko, L. P., ed. 2002. *Fizika vzryva* [Physics of explosion]. 3rd ed. Moscow: Fizmatlit. Vol. 1. 832 p.
2. Makhov, M. N. 2008. Otsenka metatel'noy sposobnosti vzryvchatykh smesey VV s borom [Evaluation of acceleration ability of explosive mixtures of HE with boron]. *Goren. Vzryv (Mosk.) — Combustion and Explosion* 1:93–96.
3. Davydov, V. Yu., and A. S. Gubin. 2011. Acceleration ability of high explosives and their mixtures with fuel additives. *Russ. J. Phys. Chem. B* 5(3):491–498. doi: 10.1134/S1990793111030183.
4. Makhov, M. N. 2015. Teplota vzryva i metatel'naya sposobnost' smesey vzryvchatykh veshchestv s titanom i gidridom titana [Heat of explosion and acceleration ability of mixtures of high explosives with titanium and titanium hydride]. *Goren. Vzryv (Mosk.) — Combustion and Explosion* 8(2):256–262.
5. Gogulya, M. F., M. N. Makhov, M. A. Brazhnikov, A. Yu. Dolgoborodov, V. I. Arkhipov, A. N. Zhigatch, I. O. Leipunskii, and M. L. Kuskov. 2008. Vzryvchatye kharakteristiki alyuminizirovannykh nanokompozitov na osnove oktogena [Explosive characteristics of aluminized HMX-based nanocomposites]. *Combust. Explo. Shock Waves* 44(2):85–100.
6. Makhov, M. N., and V. I. Arkhipov. 2008. Method for estimating the acceleration ability of aluminized high explosives. *Russ. J. Phys. Chem. B* 2(4):602–608. doi: 10.1134/S1990793108040167.
7. Makhov, M. N. 2000. Teplota vzryvchatogo razlozheniya alyuminizirovannykh vzryvchatykh veshchestv [Heat of explosive decomposition of aluminized high explosives]. *Khim. Fizika* 19(9):83–87.

Received November 18, 2015

## **Contributor**

**Makhov Michael N.** (b. 1946) — leading research scientist, N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; [makhov@polymer.chph.ras.ru](mailto:makhov@polymer.chph.ras.ru)