ON THE MECHANICAL SENSITIVITY OF MIXTURES OF EXPLOSIVES WITH SOLID PARTICLES

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Abstract: The results of experiments on sensitivity to impact and friction under rapid shear for mixtures of TNT and HMX with iron and aluminum oxides in the entire range of component concentrations are presented. In the coordinates composition – initiation pressure, a similarity of the sensitivity curves in both types of experiments was found. The previously formulated main role of the mechanism for initiating an explosion due to frictional heating of solid particles as a result of the strength destruction of charges under mechanical stresses was confirmed.

Keywords: explosive; impact; explosion; sensitivity; sensitization; friction; explosion mechanism

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References

1. Dubovik, A. V., and R. V. Ponafidin. 2018. Chuvstvitel'nost' k udaru smesey oktogena s oksidom zheleza [Sensitivity to impact of mixtures of octogen with ferric oxide]. *Goren. Vzryv (Mosk.) — Combustion and Explosion* 11(4):68–73.
2. Bowden, F. P, and A. D. Yoffe. 1952. *Initiation and growth of explosion in solids and liquids*. Cambridge University Press. 120 p.
3. Afanas'ev, G. T., and V. K. Bobolev. 1968. *Initsiirovanie tverdykh vzryvchatykh veshchestv udarom*. Moscow: Nauka. 176 p.
4. Dubovik, A. V. 2011. *Chuvstvitel'nost' tverdykh vzryvchatykh sistem k udaru* [Sensitivity of solid explosive systems to impact]. Moscow: RKhTU im. D. I. Mendeleeva. 276 p.
5. Ponafidin, R. V., and A. V. Dubovik. 2018. Chuvstvitelnost k mekhanicheskim vozdeystviyam smesey okfola-3.5 s oksidami zheleza i alyuminiya [Sensitivity to mechanical stress of mixtures of oxfol-3.5 with iron and aluminum oxides]. *Advances Chemistry Chemical Technology* 32(10):132–134.
6. Teselkin, V. A. 2008. Influence of the particle size of the components on the mechanical sensitivity of metallized high explosives. *Russ. J. Phys. Chem. B* 2(4):609–618. doi: 10.1134/ S1990793108040179.

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