STUDY OF THE ABILITY OF COMBUSTION-TO-EXPLOSION TRANSITION IN A SEMICONFINED VOLUME OF THREE EXPLOSIVES — RDX, HMX, AND CL-20

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Abstract: The results of a comparative assessment of the ability to combustion-to-explosion transition (CET) of three powerful explosives: RDX, HMX, and CL-20 — depending on a number of parameters of experimental conditions (diameter of the tube, mass of the igniter, size of particles, and presence of a less active additive) are presented. The studies were performed using a technique based on determining the critical height of explosive layer in a semiopen tube, above which its ignition at the closed end leads to an explosive process. It has been found that its value increases with an increase in the diameter of the tube and with a decrease in the power of the igniting pulse and particle size. Of those studied, the CL-20 is the most capable of exploding when ignited.

Keywords: explosive; combustion-to-explosion transition; critical layer height; phlegmatizing additive

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Figure Captions

Figure 1 Dependency of H_{cr} on the inner diameter of the tube: *1* — RDX; *2* — HMX spherical; *3* — CL-20; filled signs — CET; and empty signs — absence of CET

Figure 2 Dependency of H_{cr} on the mass of ignitor of gunpowder DRP-2: *1* — RDX; *2* — HMX; *3* — CL-20; filled signs — CET; and empty signs — absence of CET

Figure 3 Dependency of H_{cr} on the particle size of explosives: *1* — RDX; *2* — HMX; *3* — CL-20; and empty signs — absence of CET

Figure 4 Dependency of H_{cr} of the RDX samples on their content in graphite (*1*) and MTFE (*2*) mixture: filled signs — CET; empty signs — absence of CET; and *3* — basic sample of RDX

Table Caption

The results of CET research in RDX samples with additives with various physico-chemical properties

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