EXPLOSIVE PROPERTIES OF PRESSED COMPOSITIONS BASED ON AMMONIUM PERCHLORATE AND SEVILENE WITH ALUMINUM ADDITIVE

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Abstract: Previously, it was found that a stoichiometric mixture of ammonium perchlorate and sevilen (a thermoplastic adhesive, a copolymer of ethylene, and vinyl acetate) with the addition of 20% micron-sized aluminum powder in pressed dense samples gives an explosion when initiated by an electrical high-voltage discharge. In the facilitates high-voltage initiation of an explosion: explosions were detected on samples from a mixture with a 10% aluminum addition and in the case of mixtures with a 20% aluminum addition, the threshold value discharge voltage at which an explosion is initiated is significantly reduced. When aluminum was replaced by copper and zinc powders of similar fineness, there were no explosions. This confirms that it is aluminum that has the set of qualities necessary for high-voltage initiation of an explosion. The minimum discharge energy required for high-voltage explosion initiation has been determined. The dependence of the minimum energy on the method of preparing mixtures (with or without a solvent) and the amount of aluminum introduced into the mixture is obtained. The unique combination of low impact sensitivity of mixtures of ammonium perchlorate with sevilene and 20% aluminum which was obtained in a pile driver test, high susceptibility to explosion at a high-voltage discharge, and excellent adhesion of sevilene to the dispersed components of the mixture in pressed samples opens up opportunities for using this composition in devices initiation.

Keywords: detonation; high-voltage electric discharge; mixed explosives; ammonium perchlorate; sevilene; powdered aluminum

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Figure Captions

Figure 1 Test stand: *1* — upper electrode; *2* — a piston made of fluoroplastic or caprolon; *3* — bakelite paper tube; *4* — charge from the fuel mixture; *5* — bottom electrode; *6* — steel washer; *7* — fluoroplastic table; *8* and *9* — connecting wires; and *10* and *11* — terminals for connecting to the generator

Figure 2 High voltage direct current generator: CNBTR — high voltage pulse generator; R — power resistance 100 MOhm, 10 W; D — high-voltage diodes; C — capacitor bank; V — electrostatic kilovoltmeter S-96; and KP — discharge button (in experiments with a discrete increase in voltage, it is open)

Table Captions

Table 1 Results of experiments on high-voltage discharge for samples prepared in the traditional way without acetone. Pressing pressure is 16 MPa

Table 2 Results of experiments on high-voltage discharge for samples prepared with the use of acetone. Pressing pressure is 16 MPa

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