DETONATION OF THE MIXTURES OF NANOSCALE ALUMINUM WITH AMMONIUM PERCHLORATE

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Abstract: The detonation properties of high-density charges derived from a mechanically activated mixture of nanosized aluminum brand ALEX with ammonium perchlorate with 3% phlegmatizer (fluoroplastic-42) have been studied. The dependences of detonation velocity on the activation time, density, and diameter of charges were obtained. The results showed that the detonation ability of formulations can be substantially enhanced in comparison with conventional mechanical mixtures containing micronsized aluminum. The activation and nanosized aluminum sharing has allowed to lower critical diameter ($d_{cr} < 10$ mm) and to displace a maximum of detonation velocity in area of high-density charges (from 1.46 to 1.9 g/cm^3 with a diameter of 25 mm). The maximum detonation velocity of 6410 m/s for the composition with nanosized aluminum was obtained with a relative density of 0.91 and a diameter of 40 mm.

Keywords: detonation; ammonium perchlorate; nanosized aluminum; mechanical activation

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