

PERCHLORATES OF ORGANIC NITROGENOUS BASES ARE THE PROMISING COMPONENTS OF HIGH-ENERGY FUEL COMPOSITIONS

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Abstract: The effect of the introduction of perchlorates of organic nitrogenous bases — ethylenediamine diperchlorate, methylamine perchlorate, and tetramethylenediamine diperchlorate — on the energy and ballistic characteristics of high-energy fuel compositions on an active and inert combustible binder is studied. The effectiveness of replacing the used components — HMX and ammonium perchlorate with the proposed organic perchlorates — is shown in terms of increasing the combustion rate and lowering the degree of dependence of the burning rate on the pressure of high-energy fuel compositions.

Keywords: high-energy fuel compositions; ethylenediamine diperchlorate; methylamine perchlorate; tetramethylenediamine diperchlorate; combustion rate; exponent in the combustion law; specific impulse

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Figure Captions

Figure 1 Burning rates of HMX (1), ethylenediamine diperchlorate (2), and methylamine perchlorate (3)

Figure 2 Burning rates of energetic binder (1) and its mixtures with HMX (2) and fine (3) and coarse (4) methylamine perchlorate

Figure 3 Burning rates of fuel compositions based on energetic binder (1) and with 15% perchlorates of organic nitrogenous bases: 2 — methylamine perchlorate; 3 — ethylenediamine diperchlorate; 4 — its crystal hydrate; and 5 — tetramethylenediamine diperchlorate

Figure 4 Burning rates of fuel compositions based on energetic binder (1) and with 10% (2), 15% (3), and 25% (4) methylamine perchlorate and 25% ethylenediamine diperchlorate (5)

Figure 5 Burning rates of fuel compositions based on hydrocarbon binder with 25% perchlorates of organic nitrogenous bases instead of HMX (a) and instead of ammonium perchlorate (b): 1 — basic composition; 2 — 25% methylamine perchlorate; 3 — 25% ethylenediamine diperchlorate; and 4 — 25% its crystal hydrate

Figure 6 Burning rates of fuel compositions based on hydrocarbon binder: 1 — basic composition; 2 — pure ethylenediamine diperchlorate; 3 — 25% ethylenediamine diperchlorate; and 4 — 35% ethylenediamine diperchlorate

Figure 7 Burning rates of fuel compositions based on hydrocarbon binder with different content and particle size of methylamine perchlorate: 1 — basic composition; 2 — 25% methylamine perchlorate (large fraction); 3 — 25% methylamine perchlorate (small fraction); and 4 — 18% methylamine perchlorate (small fraction)

Table Captions

Table 1 Properties of HMX and perchlorates of organic nitrogenous bases [1–4]

Table 2 Combustion characteristics of energy binder, fillers, and mixtures of energetic binder with HMX and methylamine perchlorate

Table 3 Energy and ballistic characteristics of fuel compositions based on an energetic fuel binder with perchlorates

Table 4 Energy and ballistic characteristics of fuel compositions based on hydrocarbon fuel binder with perchlorates

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