

TNT EQUIVALENT OF UNDERWATER EXPLOSION OF THE MIXTURES BASED ON THE EXPLOSIVES WITH POSITIVE OXYGEN BALANCE

M. N. Makhov

N. N. Semenov Federal Research Center for Chemical Physics of the Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation

Abstract: The possibilities of increasing the shock wave energy of an underwater explosion by introducing the explosive with a positive oxygen balance into the composition of the energetic material are analyzed. For the calculations, relatively new compounds were chosen as explosive oxidizers: 3,6-dinitro-1,4-bis(trinitromethyl)-1,4-dihydropyrazolo[4,3-c]pyrazole; 4,4',5,5'-tetranitro-2,2'-bis(trinitromethyl)-2H,2'H-3,3'-bipyrazole; and 2-dinitromethyl-5-nitrotetrazole. The function of explosive fuel was performed by the well-known powerful substances HMX and CL-20. The calculations have shown that compositions containing these explosive oxidizers should have high values of the TNT equivalent in terms of shock wave energy and the most noticeable increase in the TNT equivalent due to the use of these explosive oxidizers should be expected in the case of aluminized compositions.

Keywords: TNT equivalent; explosive; oxygen balance; heat of explosion; aluminum

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Figure Captions

Figure 1 TNT-equivalent of the mixtures of HMX with oxidizers (1 — BTNEN; 2 — HNF; 3 — ADN; 4 — AP; and 5 — DNG) depending on the oxidizer mass fraction: solid curves — compositions without Al; and dashed curves — compositions with Al

Figure 2 TNT-equivalent of the mixtures of the explosives (1 — HNF; 2 — BTNEN; 3 — ADN; 4 — CL-20; 5 — DNG; 6 — HMX; and 7 — AP) with Al depending on the Al mass fraction

Figure 3 Structural formulas of compounds I–III

Figure 4 TNT-equivalent of the mixtures of CL-20 (1) or HMX (2) with the explosive oxidizer I depending on the oxidizer mass fraction: solid curves — compositions without Al; and dashed curves — compositions with Al

Figure 5 Heat of explosion of the mixtures of the explosives with Al depending on the Al mass fraction: 1 — BTNEN; 2 — CL-20; 3 — HMX; and signs — experimental values of the heat of explosion of the compositions based on BTNEN and HMX

Figure 6 TNT-equivalent of the mixtures of the explosives with Al depending on the Al mass fraction: 1 — BTNEN; 2 — CL-20; and 3 — HMX

Table Caption

Initial parameters of explosives

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Contributor

Makhov Michael N. (b. 1946) — Candidate of Science in chemistry, leading research scientist, N. N. Semenov Federal Research Center for Chemical Physics of the Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; mmn13makhov@yandex.ru