# INFLUENCE OF CATALYSTS ON THE BURNING RATE OF TRINITROBENZENE AND ITS DERIVATIVES

A. P. Denisyuk, Zar Ni Aung, and V. A. Lyubutin

D. I. Mendeleev University of Chemical Technology of Russia, 9 Miusskaya Sq., Moscow 125047, Russian Federation

**Abstract:** The effect of combustion catalysts of ballistic powders (nickel salicylate, copper, and their mixtures) individually and in combination with soot and carbon nanotubes (CNTs) on combustion of aromatic nitrocompounds: trinitrobenzene (TNB), trinitrotoluol (TNT), and trinitroresorcin (TNR) — is studied. It is shown that catalysts without additives have little effect on their burning rate but with the introduction of catalysts with soot or CNTs, the significant catalytic effect is observed, especially with CNTs. It is shown that TNR has the highest catalysis ability and TNT has the lowest ability. The effect of the catalysts decreases with pressure which leads to the decrease in the value of the exponent in the law of combustion as occurs with the burning of ballistic powders. In general, the laws and mechanism of catalysis of combustion of nitrocompounds and ballistic powders are identical, i. e., catalysis occurs only if the soot framework is formed on the combustion surface.

**Keywords:** aromatic nitrocompounds; burning rate; catalysis of the combustion; carbon nanotubes

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## Figure Captions

**Figure 1** Effects of various additives on the burning rate of TNB (*a*), TNT (*b*), and TNR (*c*): *1* — without additives; *2* — 1%UM-76; *3* — 1% CNT; *4* — 0.9%Cu-Sal + 2.1%Ni-Sal; *5* — 0.9%Cu-Sal + 2.1%Ni-Sal + 1%UM-76; *6* — 0.9%Cu-Sal + 2.1%Ni-Sal + 1%CNT; *7* — 3%Ni-Sal; *8* — 3%Ni-Sal + 1%UM-76; and *9* — 3%Ni-Sal + 1%CNT

**Figure 2** Dependences of the catalyst action efficiency on pressure during combustion of TNB (*a*), TNT (*b*), and TNR (*c*): *1* — 1%CM-76; *2* — 1%CNT; *3* — 0.9%CS + 2.1%NS; *4* — 0.9%CS + 2.1%NS + 1%CM-76; *5* — 0.9%CS + 2.1%NS + 1%CNT; *6* — 3%NS; *7* — 3%NS + 1%CM-76; and *8* — 3%NS + 1%CNT. At $P = 1/8$ MPa, the burning velocity of TNB has been determined on the 11-millimeter-diameter charge

## Table Captions

**Table 1** Effect of various additives on the burning rates of explosives

**Table 2** Values of $\nu$ for explosives in combination with various additives

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## Contributors

**Denisyuk Anatoliy P.** (b. 1938) — Doctor of Science in technology, RARAS academician, professor, head of the department of chemistry and technology of high-molecular compounds, D. I. Mendeleev University of Chemical Technology of Russia, 9 Miusskaya Sq., Moscow 125047, Russian Federation; denisap@rctu.ru

**Zar Ni Aung** (b. 1991) — 3rd year Ph.D student of the department of chemistry and technology of high-molecular compounds, D. I. Mendeleev University of Chemical Technology of Russia, 9 Miusskaya Sq., Moscow 125047, Russian Federation; yesispaing4886@gmail.com

**Lyubutin Vladimir A.** (b. 1997) — student of the department of chemistry and technology of high-molecular compounds, D. I. Mendeleev University of Chemical Technology of Russia, 9 Miusskaya Sq., Moscow 125047, Russian Federation; vlubutin@mail.ru