Physico-chemical characteristics of energy condensed compositions based on polynitrogen heterocyclic compounds, poly-2-methyl-5-vinyltetrazole and SKI-3 rubber

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As an energetic condensed material (**ECM**), it was proposed to use a composition of high-enthalpy polynitrogen compound 1,1'-dioxide-7,7'-bis(tris([1,2,5]oxadiazolo)[3,4-b: 3', 4'-d: 3",4"-f] azepine) (**$Az_2(O)_2$**), isoprene rubber **SKI-3** and poly-2-methyl-5-vinyltetrazole (**PMVT**) as an active binder. The latter can serve as a useful additive to hydrocarbon binder to increase the temperature of the adiabatic transformation of solid fuel and to improve the characteristics of its combustion.

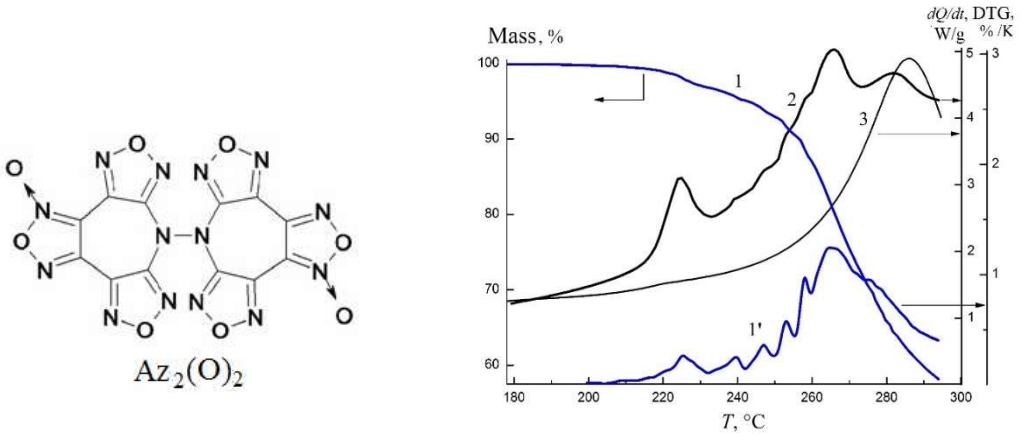

Figure 1. TGA (1) and differential TGA (1') of the **$Az_2(O)_2$ + PMVT** mixure; DSC in the decomposition of **$Az_2(O)_2$+PMVT** (2) and **PMVT** (3). Temperature rise rate 20 K/min.

The kinetic regularities of thermal decomposition and ballistic characteristics of a number of compositions based on **$Az_2(O)_2$** have been determined. It has been established that the burning rate of binary compositions **$Az_2(O)_2$ - PMVT** increases, and the thermal stability decreases compared to the corresponding characteristics of the initial components. It is shown that under nonisothermal conditions of decomposition of the mixture of 50 wt % **$Az_2(O)_2$** + 50 wt % **PMVT**, the DSC curves exhibit several maxima of the heat release rates, which are symbatic with the inflection points of the TGA curves. Thus, when creating formulations for energy condensed materials, it is necessary to take into account the possibility of their thermal decomposition processes occurring through a number of macroscopic stages, which, under certain conditions, can go into an oscillatory mode. The compositions were optimized on the basis of the above three components in terms of such characteristics as burning rate, thermal stability and relative flight range.

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