PHYSICS OF COMBUSTION OF MECHANICAL ACTIVATED COMPOSITIONS WITH TITANIUM–BORON–FLUORINEPLAST CONTENT

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Abstract: The paper is aimed at investigation of combustion of Ti–B–fluoroplast compositions. The used compositions consist of small spheres of Ti + B powder mixtures, coated with a layer of fluoroplast ($[C_2F_4]_n$, $[C_2F_4]_n$ + $[C_2H_2F_4]_n$). The spheres (globuls) have 20–28 μm in diameter. The compositions were subjected to mechanical activation and then used for pellet preparations. The pellets having various density and content were burned in a still vessel in nitrogen atmosphere at 0.1–8.0 MPa. For all experiments, the time histories of pressure were detected. The experimental time histories of pressure were used to obtain the time histories of the reaction relative completeness and the time histories of the gas release rate. Thermocouples installed under pellets showed the arrival of the ignition wave. The presented tables show combustion rates along the pellets, ignition wave velocities, and reaction wave velocities propagating inside the globuls in each regime. The models of porous pellet combustion were developed and used for obtaining the values of w. The optimal time for mechanical activation, which allows obtaining the maximum values of w, was found.

Keywords: titanium–boron–fluoroplastic compositions; mechanical activation; combustion; optimal time of activation

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