UNUSUAL BEHAVIOR OF BIMOLECULAR CL-20 CRYSTALS IN A THERMAL WAVE

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Abstract: Combustion behavior, flame structure, and thermal decomposition of bimolecular crystals of hexanitrohexaazaisowurtzitane (CL-20) with tris[1,2,5]oxadiazolo[3,4-b:3′,4′-d:3″,4″-f]azepine-7-amine (ATFAz) in a molar ratio of 1 : 2 have been studied. It has been found that the introduction of a more volatile and more heat-resistant component, ATFAz, into the composition of bimolecular crystals of CL-20 leads to unexpected results: firstly, the heat-resistant component reduces the thermal stability of CL-20, and secondly, even dilution by half virtually does not change the burning rate of the system. The reason for unusual results is the amorphous state of CL-20, in which nitramine remains after evaporation of the second component in the thermal wave. The above assumption was confirmed by modeling the combustion of bimolecular crystals of CL-20 in a wide pressure interval.

Keywords: bimolecular crystals; hexanitrohexaazaisowurtzitane; tris[1,2,5]oxadiazolo[3,4-b:3′,4′d:3″,4″-f]azepin-7-amine; thermal decomposition; combustion; temperature profiles; combustion mechanism

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