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Features of thermal decomposition and thermal explosion of compositions with polycrystals of polyethylene glycol, cyclic nitrates and oxidizing agents

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Abstract

Characteristics of thermal decomposition and heat explosion of mixed energy materials (EMS) define a wide range of their properties: ignition and combustion characteristics, sensitivity to external influences of different physical nature, and also ways and possibilities of ensuring safety of technological and operational measures at manufacture and use of EMS and products on their basis. Formation of molecular complexes between components of EMS leads to not predicted influence on characteristics of their thermal decomposition and thermal explosion. At the same time, the publications pay little attention to the properties of molecular complexes polar polymer/fillers of different types-nitrate, salt-nature oxidants and their influence on the characteristics of EMS. On the other hand, available data on the interaction of nitrates with cellulose, perchlorates and nitrates with polar polymers require detailed consideration of these issues in relation to the wider range of polar polymers used in EMS compositions. Earlier we studied regularities of formation, characteristics of thermal behavior and decomposition of co-crystallizes some polar polymers with HNIW and linear nitrate. Recently published works devoted to the properties of metastate amorphous structures and polycrystalized polyvinyl acetate with cyclic nitrate HNIW and HMX, including the use of mixtures of two nitrates. These works give consistent results and set the task of detailed study of the influence of molecular complexes formation polymer/filler on the characteristics of thermal decomposition, heat explosion and other properties of EMS. In this study, to study the possibility of formation of molecular complexes of polymers with basic fillers, EMS as a polymer basis of compositions is considered crystallizing low-molecular polyethylene glycol. Molecular complexes in the form of solid under normal conditions of solutions, mixed compositions for investigation of their thermal decomposition and parameters of heat explosion were prepared in the melt of polyethylene glycol. As components of compositions are used such fillers EMS, as cyclic nitrates HNIW, HMX and oxidizer perchlorate ammonium.

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