

# The gaseous phase product composition, kinetics and mechanism of thermal decomposition of ammonium perchlorate and pentaerythrite tetranitrate

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For slow thermal decomposition, the information on kinetics, mechanism, and composition of the reaction products is essential, especially when one has to solve engineering problems associated with determination of the working gas thermodynamic properties for energetic and reaction materials (RM), synthesis of new materials, and warranty lifetime tests. Thermal analysis methods combined with simultaneous registration of the IR absorption spectra, as well as the mass spectra with chromatography are widely used to study the composition of products formed in the thermal decomposition of different materials (RM, polymers, pharmaceuticals, construction mixtures and fillers). Other methods used to analyze the composition of the gaseous phase products formed as a result of chemical reactions are also known. In the present paper, we analyze properties of the gaseous phase formed in the slow thermal decomposition of ammonium perchlorate (APC) and pentaerythritol tetranitrate (PETN). Stages of chemical reactions and the expected activation energy of the formation process were specified for each defined component.