THERMAL DECOMPOSITION OF CYANURIC TRIAZIDE

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Abstract: Thermal decomposition of cyanuric triazide in melt and in dinonyl phtalate solution has been studied by means of thermogravimetry, manometry, mass spectrometry, and infrared spectroscopy. Kinetic and activation parameters of the processes have been determined. Nitrogen is the only gaseous product of the reaction. This fact as well as the structure of the condensed residue after cyanuric triazide thermal decomposition in melt indicate elimination of nitrogen molecules from azide groups at the initial stage of reaction followed by subsequent reactions resulting in the formation of flat networks with polyconjugated bonds between C and N atoms. For thermal decomposition of cyanuric triazide in solution, preexponential factor of $10^{12.8}$ s^{-1} and activation energy of 34100 cal/mol have been found. These values are typical for thermal decomposition of the majority of organic azides. Anomalously high values of effective activation parameters for the reaction in melt (accordingly, $10^{17.4}$ s^{-1} and 42300 cal/mol), are explained in frames of the mechanism of polymerization (polycondensation) with formation of two-dimensional networks in the rate-determining stage. The conclusion is drawn that high impact sensitivity of cyanuric triazide has the kinetic nature.

Keywords: cyanuric triazide; thermal decomposition; kinetics; sensitivity

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