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Thermal Decomposition of Ammonium per chlorate-Tetra-n-butyl Ammonium per chlorate Mixtures

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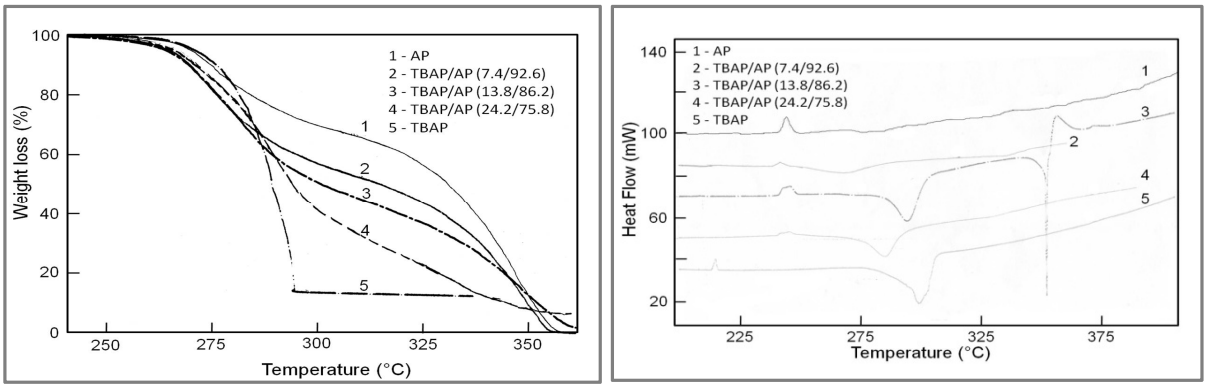
ABSTRACT

The role of tetra butyl ammonium per chlorate (TBAP) towards modification of thermal decomposition of ammonium per chlorate (AP) is presented considering their mixtures from oxidizer-rich composition, stoichiometric composition, and fuel-rich composition. Thermo-analytical investigations have been carried out in an inert atmosphere of pure nitrogen, at a sample heating rate of 5°C min^{-1}, and in Perkin-Elmer-7 series systems. Since the decomposition temperature regime of TBAP falls in the range of the first-stage decomposition of AP, it is expected to influence the first-stage decomposition of AP in the formulations studied. Experimental observations confirm this hypothesis. Kinetic parameters, evaluated employing Coats-Redfern equation corroborate well with the above observations. These studies indicate that the stoichiometric composition may be considered for rocket propulsion applications in the arena of air-breathing propulsion.

Graphical Abstract



Thermal Decomposition of Ammonium per chlorate-Tetra-n-butyl Ammonium per chlorate Mixtures were studied in an inert atmosphere of pure nitrogen, at a sample heating rate of 5°C min^{-1}.

Keywords: Ammonium per chlorate, Tetra butyl ammonium per chlorate, Mixtures, Air-breathing propulsion, Fuel-rich propellants.