

# COMBUSTION MECHANISM OF PERCHLORATES OF METHYL AMMONIUM DERIVATIVES

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**Abstract:** Possible reasons for the unusual dependences of the burning rates on the pressure of onium salts of perchloric acid with methylamines are considered. It is shown that combustion of perchlorates of methyl ammonium derivatives is formed from the competition of precesses in the gas and condensed phases. In the implementation of the gas-phase combustion mechanism, very large evaporation enthalpies of salts play a huge role in the stability of salt combustion. The process of salt evaporation also affects the condensed-phase mechanism through high dissociation (surface) temperatures.

**Keywords:** energetic materials; perchlorates; tetramethylammonium perchlorate; combustion; decomposition kinetics

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## Figure Captions

**Figure 1** The combustion temperature of perchlorate salts at a pressure of 10 MPa depending on the oxidizer/fuel ratio

**Figure 2** Comparison of the burning rates of organic amine perchlorates and ammonium perchlorate

**Figure 3** Differential scanning calorimetry (DSC) curve of tetramethylammonium perchlorate (TMAP) decomposition (heating rate 10 °C/min)

**Figure 4** The TMAP gas evolution curves at different temperatures

**Figure 5** Comparison of TMAP decomposition constants under nonisothermal (DSC) and isothermal conditions ( $k_s$  and  $k_{liq}$ ) and decomposition rate constants of AP (1 [8]), MAP (2 [5]), DMAP (3 [5]), and TrMAP (4 [5])

**Figure 6** Comparison of heats of combustion  $Q$  (1) and sublimation  $L_{sub}$  (2) for different salts

## Table Caption

Some physicochemical properties of perchlorate salts

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