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## Plastic Propellant: Aluminized Compositions

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**Abstract:** The addition of aluminium to plastic propellants has resulted in a marked improvement in performance over the whole range of burning rates, 0.1 to 1.65 inch/sec. (at 1000 p.s.i.). In particular, high measured specific impulses (at least 245 lb.sec/lb) and high thrust efficiencies have been obtained with propellants burning at rates above 0.6 inch/sec. at 1000 p.s.i. and containing up to 18 per cent aluminium. Lower burning rates have been achieved by replacing oxidizer by ammonium picrate, but this was accompanied by a reduction in measured impulse and thrust efficiency. The thrust efficiency of aluminized propellants is influenced by the three parameters: matrix energy (the energy of the binder/oxidizer part of the propellant) the propellant burning rate and the rocket motor size. The thrust efficiency of the fast-burning, high-matrix-energy propellant, is probably unaffected by motor size until more than 20 per cent aluminium is present. The aluminium particle size has no effect on combustion efficiency although it affects burning rate, pressure dependence and temperature coefficient of burning rate. The addition of aluminium to plastic propellant has presented no additional hazard or new manufacturing problem, and the chemical stability has been unaffected.

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