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COMPOSITE SOLID PROPELLENT IGNITION: IGNITION OF AMMONIA AND OTHER FUELS BY PERCHLORIC ACID VAPOUR.

 Authors: [G. S. Pearson](#); [D. Sutton](#); [ROCKET PROPULSION ESTABLISHMENT WESTCOTT \(ENGLAND\)](#)

Abstract: The ignition of polyisobutene, polyurethane, polystyrene and polymethyl-methacrylate has been studied with oxygen gas and with perchloric acid vapour under the same experimental conditions. All these fuels ignited with perchloric acid vapour at 200-250C whereas ignitions with oxygen were only achieved at temperatures above 350C. Less volatile fuels such as carbon black, nylon and terylene also ignited with perchloric acid vapour at 200-250C. Ignition of ammonia, methane, ethylene and isobutene was not achieved by perchloric acid vapour in the absence of a surface at 200-250C. In the presence of a surface the order of decreasing ignitability was ammonia, isobutene, ethylene, methane. Cupric chromate and ferric oxide were effective catalysts in the ignition of gaseous fuels with perchloric acid vapour.

Titanium dioxide, silica and alumina had no detectable effect. It is concluded that in ammonium perchlorate propellents the important reactions leading to ignition are heterogeneous rather than homogeneous, and that in a catalysed propellent the reaction of ammonia and perchloric acid on the surface of the catalyst is the significant reaction. The results are discussed in relation to current theories of the mechanism of the ignition of composite solid propellents containing ammonium perchlorate. (Author)

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Description: Technical rept.

Pages: 22

Report Date: JUN 1966

Report Number: 0908046

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