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### COMBUSTION CHEMISTRY OF HIGH ENERGY PYROPHORIC FUELS

Authors: [Charles A. Andrade](#); [MARTIN MARIETTA AEROSPACE ORLANDO FL](#); [MARTIN MARIETTA AEROSPACE ORLANDO FL](#)

**Abstract:** The research reported is directed toward further understanding of the fundamental processes in supersonic combustion. Part One describes a branching chain mechanism constructed for oxy-**diborane** mixtures diluted in argon. Included in this postulated mechanism is the production of hydroxyl as an ignition intermediate. A spectrograph was used to view the oxy **diborane** system through the end plate of a single pulse shock tube. Hydroxyl and several boron intermediates were identified, qualitatively verifying both mechanism and equilibrium calculations. Ignition induction measurements were performed up to 950K behind the reflected shock wave. These measurements extend previously known data by two orders of magnitude in the induction time. Part Two of this report describes the CAL Nonequilibrium Normal Shock Wave Program which was extended for use with highly exothermic branching chain reactions, checked out with known hydrogen oxygen kinetics, and reformulated to include transport and radiative energy transfer mechanisms.

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|-------------------------|---|
| <b>Limitations:</b>     |  APPROVED FOR PUBLIC RELEASE |
| <b>Description:</b>     | Final scientific rept.  |
| <b>Pages:</b>           | 116   |
| <b>Report Date:</b>     | 26 MAY 1969   |
| <b>Contract Number:</b> | 638, AF496381566  |
| <b>Report Number:</b>   | 0523396   |



Keywords relating to this report:

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