

Methylcyclohexane Auto-ignition Measurements Observed Over a Large Pressure Range

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By

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Abstract

The ignition of methylcyclohexane/synthetic air mixtures was studied at temperatures and pressures ranging from 818 to 1319 K and 11.0 to 69.5 atm for equivalence ratios of 0.25, 0.5, and 1.0. Endwall OH* emission and sidewall pressure measurements were used to determine ignition delay times. The influence of temperature, pressure, and equivalence ratio on ignition was characterized. Negative temperature coefficient behavior was observed for temperatures below 1000 K and a reduction in pressure dependence with decreasing equivalence ratio was observed similar to what has been observed for toluene/air ignition. Results agree well with previous shock tube study of Vasu et al. [S. S. Vasu, N. N. Parikh, D. F. Davidson, and R. K. Hanson, 5th US Combustion Meeting, (2007) paper D17] and rapid compression machine study of Pitz et al. [W. J. Pitz, C. V. Naik, T. N. Mhaolduin, C. K. Westbrook, H. J. Curran, J. P. Orme, and J. M. Simmie, Proc. Combust. Inst. 31 (2007) 267-275] for stoichiometric mixtures. However, the current data greatly extends the equivalence ratio and pressure range of available kinetic targets for methylcyclohexane. The mechanisms from Orme et al. [J. P. Orme, H. J. Curran, and J. M. Simmie, J. Phys. Chem. A 110 (2006) 114-131] and Pitz et al. demonstrate trends similar to what has been experimentally observed but disagree for ignition times.