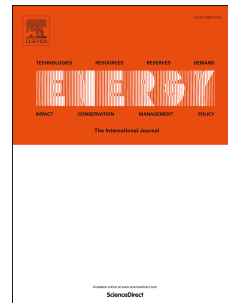


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# Experimental and Modeling Study of The Mutual Oxidation of N-pentane and Nitrogen Dioxide at Low and High Temperatures in a Jet Stirred Reactor

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**Abstract:** The mutual oxidation of n-pentane and NO<sub>2</sub> at 500-1000K has been studied at equivalence ratios of 0.5 and 1.33 by using an atmospheric-pressure jet stirred reactor (JSR). N-pentane, O<sub>2</sub>, NO, NO<sub>2</sub>, CO, CO<sub>2</sub>, CH<sub>2</sub>O, C<sub>2</sub>H<sub>4</sub>, and CH<sub>3</sub>CHO are simultaneously quantified, in-situ by using an electron-impact molecular beam mass spectrometer (EI-MBMS), a micro-gas chromatograph ( $\mu$ -GC), and a mid-IR dual-modulation faraday rotation spectrometer (DM-FRS). Both fuel lean and rich experiments show that, in 550-650K, NO<sub>2</sub> addition inhibits low temperature oxidation. With an increase of temperature to the negative temperature coefficient (NTC) region (650-750K), NO<sub>2</sub> addition weakens the NTC behavior. In 750-1000K, high temperature oxidation is accelerated with NO<sub>2</sub> addition and shifted to lower temperature. Two kinetic models, a newly developed RMG n-pentane/NO<sub>x</sub> model and Zhao's n-pentane/NO<sub>x</sub> model (Zhao et al. 2018, Submitted) were validated against experimental data. Both models were able to capture the

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