**A Chemical Kinetic Study of the Alternative Transportation Fuel, *tertiary*-Butanol**

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The combustion chemistry of *tertiary*-butanol is studied experimentally in a high pressure flow reactor and in counterflow diffusion flames. Princeton Variable Pressure Flow Reactor results show that *t*-butanol does not exhibit low temperature chemistry, and thus has no negative temperature coefficient behavior under the studied conditions. The onset of gas phase chemistry at high pressure occurs at ∼780 K. Over the temperature range of 780–950 K, *t*-butanol primarily reacts through hydrogen abstraction − alkyl or alkoxy radical beta-scission pathways to form methyl and propen-2-ol, which likely tautomerizes in the sampling system to form acetone. A species sampling study of a *t*-butanol counterflow diffusion flame reveals that the high temperature consumption routes of *t*-butanol lead to the stable intermediates isobutene, acetone, and methane, with isobutene existing in the highest concentrations. The extinction limits of *t*-butanol, isobutene, acetone, and methane diffusion flames are also reported. On a transport-weighted enthalpy basis,*t*-butanol extinguishes more readily than any of its primary intermediates, signifying that it is kinetically less resistant to extinction than the products of its initial reactions. Numerical simulation of these *t*-butanolflames reveals that the isobutene and acetone chemistry sub-models significantly affect the computed extinction limits. Improvement in the current understanding of isobutene oxidation kinetics, in particular, appears necessary to developing reliable kinetic models for *t*-butanol combustion.