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Biological Sciences Biochemistry

Combustion of JP8 in Laminar Premixed Flames

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Abstract: Experimental and numerical studies are carried out to develop a surrogate that can reproduce selected aspects of combustion of **JP-8**. Surrogate fuels are defined as mixtures of few hydrocarbon compounds with combustion characteristics similar to those of commercial fuels. A mixture of n-dodecane and trimethylbenzene, called the Aachen surrogate, and a mixture of n-dodecane, methylcyclohexane, and o-xylene called Surrogate C are selected for consideration as possible surrogates of **JP-8**. Experiments under nonpremixed conditions are carried out employing the counterflow configuration. The fuels tested are **JP-8** and the Aachen surrogate. Critical conditions of extinction, autoignition, and volume fraction of soot measured in laminar nonpremixed flows burning the Aachen surrogate are found to be similar to those in flames burning **JP-8**. Numerical calculations are performed using the chemical kinetic mechanism for the Aachen surrogate. The calculated values of the critical conditions of autoignition and soot volume fraction agree well with experimental data. Experimental studies are carried out to characterize premixed combustion of jet fuels and its surrogates in laminar nonuniform flows. The counterflow configuration is employed. Studies are performed with a premixed reactant stream made up of prevaporized fuel, oxygen and nitrogen from one duct, and an inert stream of nitrogen from the other duct. Critical conditions of extinction are measured for **JP-8**, Aachen surrogate and Surrogate C. The measured critical conditions of extinction of these surrogates agree well with those for **JP-8**. This study confirms that the Aachen Surrogate and Surrogate C are possible surrogates of **JP-8**.

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