

Fuel Additive Effects on Soot across a Suite of Laboratory Devices, Part 1: Ethanol

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Abstract

The impact of a variety of non-metallic fuel additives on soot was investigated in a collaborative university, industry and government effort. The main objective of this program was to obtain fundamental understanding of the mechanisms through which blending compounds into a fuel affects soot emissions. The research team used a suite of laboratory devices that included a shock tube, a well-stirred reactor, a premixed flat flame, an opposed-jet diffusion flame, and a high pressure turbulent reactor. The work reported here focuses on the effects of ethanol addition to ethylene on soot. The addition of ethanol led to substantial reductions in soot in all of the devices except for the opposed-jet diffusion flame. Modeling of the premixed flame and opposed-jet diffusion flame was used to obtain insights into the mechanism behind the opposing effects of ethanol addition in these two flames.

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