DIRECT AND COLLISIONAL EXCITATION OF AUTOMOTOVE FUEL COMPONENTS)

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Adding energy directly into the vibrational modes of automotive fuel may reduce the threshold energy required for combustion, without raising the combustion charge temperature. This energy can be supplied either directly via incident laser radiation or indirectly through collision with directly excited molecules. The most common chemical in commercial gasoline, isooctane, does not absorb infrared radiation sufficiently at any wavelength for which an infrared laser is readily available. However, CO2 lasers are relatively cheap, and are available at wavelengths which are absorbed by isopropanol as well as ethanol, which is also a component of commercial gasoline. In this study, the infrared absorption of isopropanol and ethanol in balance isooctane were measured at three wavelengths (10.6m, 10.2m, and 9.3m ) of incident CO2 laser radiation. Additional time-resolved emission measurements were performed for these mixtures. The data support the existence of the proposed collisional pathway for energy transfer from ethanol and isopropanol to isooctane.