MEASUREMENTS OF HIGH-TEMPERATURE ABSORPTION SPECTRA OF DIMETHYL ETHER AND DIETHYL ETHER BETWEEN 950 AND 1190 cm^{-1}AND THEIR DIRECT PYROLYSIS STUDY IN A SHOCK TUBE

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Laser absorption spectroscopy has been proved to be a powerful diagnostic tool for high enthalpic systems like exoplanets, combustion applications and hypersonic flows. But there is a scarcity of high-temperature absorption data, especially for large molecules due to technical challenges like limited availability of optical materials necessary to withstand high temperatures. Furthermore, generating a chemically stable, homogeneous and steady gas state for a sufficient duration to carry out such high-temperature measurements is rather complicated and most experimental approaches satisfy only a few of these requirements. In this work, we present measurements of temperature-dependent absorption cross-section between 950-1190 $\mathrm{cm}^{-1}$of dimethyl ether (DME) and diethyl ether (DEE) and their direct pyrolysis study. The methodology employed here consists of rapid tuning, wide range/fixed wavelength MIRcat-QT laser in conjugation with shock tube. The spectral measurements are performed between 600-900 K, at around 1.2 bar. The measured IR absorption spectra are the first experimental measurements of high-temperature spectra of these species and show strong temperature dependence. For the first time absorption cross-section correlation has been provided for a wide range of spectra over a wide range of temperatures. These measured spectra have provided a significant idea about the trend in spectra at elevated temperatures and helped in the selection of promising wavelengths for sensitive detection. DME and DEE pyrolysis studies are performed at 1121.7 $\mathrm{cm}^{-1}$and 1115 cm^{-1}respectively by providing the marginal temperature dependence absorption cross-section correlations.