MEASUREMENT OF CROSS-SECTIONS AND PSEUDOLINE GENERATION FOR TOLUENE(C_7H_8) IN THE 7-15 μM REGION AT 240 – 298 K

KEEYOON SUNG, DEACON J NEMCHICK, GEOFFREY C. TOON, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA*; CONOR A NIXON, *Planetary Systems Laboratory, NASA Goddard Space Flight Center, Baltimore, MD, USA*.

In search of elusive species that might be captured in the Cassini/CIRS and the JWST/MIRI spectral observations, high-precision laboratory spectroscopy constitutes a critical input to Titan atmospheric modeling emission features. For this, we have conducted a series of laboratory studies on hydrocarbons that are likely to be present in the Titan atmosphere (Sung et al. 2020, 2018, 2016, 2013). In this work, we report the measurements of temperature-dependent cross-sections of toluene in the mid-infrared (7-15 μ m) region. For this, we obtained 23 pure and N_2-mixture spectra at 240–298 K using a high-resolution Fourier transform spectrometer (Bruker IFS 125 HR) at the Jet Propulsion Laboratory. Moreover, we have generated empirical spectroscopic pseudoline parameters by fitting all the 23 laboratory spectra together. We observed that the pseudoline parameters (which consist of line position, intensities, and effective lower state energies) could reproduce most of the observed features within 3 % through line-by-line radiative transfer calculations, showing the pseudoline parameters are an excellent practical alternative until the line-by-line spectroscopic line parameters become available. We will present the results and comparisons to existing lower resolution spectra from the PNNL (Sharpe et al.2004).[a]

[a]Government support acknowledged.