

FT-IR MEASUREMENTS OF MID-IR PROPENE (C₃H₆) CROSS SECTIONS FOR TITAN STRATOSPHERE

KEEYOON SUNG, GEOFFREY C. TOON, BRIAN DROUIN, TIMOTHY J. CRAWFORD, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA*; ARLAN MANTZ, *Department of Physics, Astronomy and Geophysics, Connecticut College, New London, CT, USA*; MARY ANN H. SMITH, *Science Directorate, NASA Langley Research Center, Hampton, VA, USA*.

We present temperature dependent cross sections of propene (C₃H₆; CH₂-CH-CH₃, propylene), which was detected in the stratosphere of Titan.^a For this study, a series of high-resolution (0.0022 cm⁻¹) spectra of pure and N₂-mixture samples were recorded at 150 – 296 K in the 650 – 1530 cm⁻¹ (6.5 – 15.3 μm) at the Jet Propulsion Laboratory using a Fourier-transform spectrometer and a custom-designed cold cell^{b,c}. The observed spectral features cover the strongest band (ν₁₉) with its outstanding Q-branch peak at 912 cm⁻¹ and three other strong bands: ν₁₈, ν₁₆ and ν₇ at 990, 1442, and 1459 cm⁻¹, respectively. In addition, we have generated a HITRAN-format empirical ‘pseudoline list’ consisting of line positions, intensities, and effective lower state energies, which were determined by fitting all the observed propene spectra simultaneously. A newly derived partition function was used in the analysis. The results are compared with early work from relatively warm temperatures (278 – 323 K).^d

^aC. A. Nixon, et al., *Astrophys. J. Lett.*, 776, L14 (2013).

^bA.W. Mantz, K. Sung, et al. 65th Symposium on Molecular Spectroscopy, Columbus, OH, 2010.

^cK. Sung, A.W. Mantz, et al., *J. Mol. Spectrosc.* 262, 122 – 134 (2010).

^dResearch described in this talk was performed at the Jet Propulsion Laboratory, California Institute of Technology, Connecticut College, and NASA Langley Research Center under contracts and cooperative agreements with the National Aeronautics and Space Administration.