FT-IR MEASUREMENTS OF MID-IR PROPENE (C_3H_6) CROSS SECTIONS FOR TITAN STRATOSPHERE

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We present temperature dependent cross sections of propene (C_3H_6; CH_2-CH-CH_3, 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 N_2-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[bc]. The observed spectral features cover the strongest band (ν_{19}) with its outstanding Q-branch peak at 912 $\mathrm{cm}^{-1}$and three other strong bands: ν_{18}, ν_{16} and ν_7 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]

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[a] C. A. Nixon, et al., Astrophys. J. Lett., 776, L14 (2013).

[b] A.W. Mantz, K. Sung, et al. 65th Symposium on Molecular Spectroscopy, Columbus, OH, 2010.

[c] K. Sung, A.W. Mantz, et al., J. Mol. Spectrosc. 262, 122 – 134 (2010).

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