FT-IR MEASUREMENTS OF CROSS SECTIONS OF COLD C_3H_8 IN THE 7 - 15 μm FOR TITAN

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To support atmospheric remote sensing of Titan, the absorption cross sections of N_2-broadened C_3H_8 were obtained at temperatures between 145 and 296 K. For this, 35 spectra of pure- and N_2-broadened propane were recorded in the 670 to 1900 cm-1 region using a Fourier transform spectrometer (Bruker IFS-125HR) at the Jet Propulsion Laboratory. A 20.38 cm path temperature-stabilized cryogenic absorption cell was used, which was developed at Connecticut College and described previously [1]. We report the absorption cross sections at the various cold temperatures for nine strong fundamental bands (ν_{26}, ν_8, ν_{21}, ν_{20}, ν_7, ν_{19}, ν_{18}, ν_4, ν_{24}) as well as for many contributions from hot and combination bands. In addition, we present results from 'pseudo -line generation' (http://mark4sun.jpl.nasa.gov/data/spec/Pseudo/Readme), which includes mean intensities and effective lower state energies on a 0.005 cm^{-1} frequency grid determined in the 690 - 1536 cm^{-1} region from all 35 high-resolution laboratory spectra. It was observed that the pseudo lines reproduce all the observed spectral transmittances well within 3% and the C_3H_8 amounts within 4% on the average. The measured cross sections and synthetic spectra from the pseudoline compilation are compared to earlier work, including the C_3H_8+N_2 spectra recorded at PNNL [2] and line-by-line predictions available [3, 4].[a] [b]

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[a] [1] K. Sung, A. W. Mantz, M. A. H. Smith, et al., J Mol Spectrosc 262, 122, 2010.; [2] S. W. Sharpe, et al., Appl Spectrosc 58, 1452, 2004.; [3] J. M. Flaud et al., Mol Phys 108, 699, 2010.; [4] J. M. Flaud et al., J Chem Phys 114, 9361, 2001.

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