

FIRST HIGH RESOLUTION IR SPECTRA OF 1-¹³C-PROPANE. THE ν_9 B-TYPE BAND NEAR 366.404 cm^{-1} AND THE ν_{26} C-TYPE BAND NEAR 748.470 cm^{-1} . DETERMINATION OF GROUND AND UPPER STATE CONSTANTS.

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We report in this talk on the first high resolution IR spectra ($\Delta\nu = 0.0009 \text{ cm}^{-1}$) of the 1-¹³C-Propane isotopologue. Spectra were taken on the Bruker FTS instrument on the Far-IR beamline at the Canadian National Synchrotron (CLS) located at the University of Saskatchewan. The ν_9 B-type band centered near 366.404 cm^{-1} appears unperturbed and lines were assigned up to $K = 17$ and $J = 50$. Since the 1960 MW study of Lide^a only used 6 J lines of $K = 0$ we had to use GSCD analyses to determine a fuller set of molecular constants for this molecule. Since normal propane has been detected using the ν_{26} C-type band in Titan and other astrophysical objects our main focus was on the analogous bands for the both the 1-¹³C and 2-¹³C isotopologues. Assigned lines up to $K = 17$, $J = 50$ in ν_{26} were analyzed with GSCD to independently obtain ground state rotational constants. These were consistent with those obtained from the ν_9 analysis. Upper state constants were also determined that reproduce the vast majority of this band. As in the normal and 2-¹³C species a Coriolis resonance with the $2\nu_9$ state causes lines of most K levels above 15 to be shifted.^b We did not have enough sample available at the time of these experiments to be able to record the $2\nu_9 - \nu_9$ hot band transitions in the low frequency study of ν_9 .

^aLide, J. Chem. Phys. **33**, p. 1514 ff. (1960)

^bFlaud, Kwabia Tchana, Lafferty & Nixon, Mol. Phys. **108**, p. 699 ff. (2010)