FIRST FAR-IR SPECTRA OF 2,2-D_2-PROPANE: THE ν_9 (A_1) B-TYPE BAND NEAR 365.3508 cm^{-1}. THE DETERMINATION OF GROUND AND UPPER STATE CONSTANTS.

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Only old IR and no MW data exist for this molecule.[a] Last year we reported (2017 ISMS, TK08) on the ν_{20} (B_1) A-type band recorded in CLS Cycle 23 (Jan-May, 2016). This was the only band with easily assignable lines. Other bands were perturbed and not assignable at present. We assigned most of ν_{20} and rotational constants were determined for this molecule. Our ν_{20} data was limited in K and J values due to the pressure used and time limitations in that cycle. Also some small torsional perturbations may have affected the derived constants. From our recent studies ν_9 bands appear unperturbed for the other ^{13}C and D isotopologues. Therefore we recorded that band for 2,2-D_2-Propane in the Far-IR at higher pressures in new experiments. The spectrum of the ν_9 (A_1) band (CCC bend) was recorded on the Far-IR beamline during CLS Cycle 27 (Jun-Dec, 2017). Spectra were recorded at 4.055 Torr ($\Delta\nu$ = 0.00096 cm-1) and 7.691 Torr ($\Delta\nu$ = 0.0020 cm-1) to see higher K and J transitions. An optical path of 72 m and a cell temperature of 265.75K were used. We assigned over 5900 lines with both traditional methods and the aid of the PGOPHER program of Colin Western.[b] Lines up to K = 37 and J = 55 were assigned by using both pressure data sets. Improved rotational constants including the inertial and centrifugal distortional constants will be reported. This varied isotopic data should improve the r_0 structure.

[a]Friedman & Turkevich, J. Chem. Phys. **17**, 1012 ff. (1949); McMurry, Thornton & Condon, J. Chem. Phys. **17**, 918 ff. (1949); McMurry & Thornton, J. Chem. Phys. **19**, 1014 ff. (1951).; Gayles & King, Spectrochim. Acta **21**, 543 ff. (1965); Kondo & Saeki, Spectrochim. Acta **29A**, 735 ff. (1973).

[b]C. Western, JQSRT **186**, 221 ff. (2017)