

BROADBAND MICROWAVE SPECTRUM AND STRUCTURE OF CYCLOPROPYL CYANOSILANE

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The structure of cyclopropane cyanosilane has been studied using chirped-pulse Fourier transform microwave (CP-FTMW) spectroscopy in the 6.5-18 GHz band. Two conformers of similar intensity were detected, one with a gauche orientation of the cyanosilane group with respect to the plane of the ring, and the other with a staggered conformation. The sensitivity of the CP-FTMW experiment was sufficient enough to assign spectra for all common singly-substituted heavy atom isotopologues (^{13}C , $^{29/30}\text{Si}$, ^{15}N) for each conformer, resulting in a full heavy atom Kraitchman structure of the molecule in good agreement with the predicted structure. Additionally, the hyperfine effects have been analyzed for the ^{14}N -containing parent species.

Results will also be presented on the potential tunneling spectrum arising from the symmetric double well torsional potential of the gauche conformer. Some observed transitions, especially with frequencies near the upper end of the measured band, exhibit splittings that could potentially be associated with a tunneling splitting. However, the resolution is not sufficient to provide a complete quantitative analysis of this effect.