THE GROUND STATE TORSION-ROTATION SPECTRUM OF PROPARGYL ALCOHOL ($HCCCH_2OH$)

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The ground state torsion-rotation spectrum of the asymmetric internal hydroxyl rotation in propargyl alcohol ($HCCCH_2OH$) has been investigated in the 84 to 640 GHz range. The ground state has been confirmed to consists of two torsional sub-states of the *gauche* conformer[a], a symmetric *gauche* state (*gauche+*) and an antisymmetric *gauche* state (*gauche-*). No evidence of a low lying third state or *trans* conformer has been observed. The more stable *gauche+* state is 652389.5 MHz below the *gauche-* state. Due to their close proximity, the two *gauche* states interact strongly through a series of a- and b-type Coriolis interactions. Strong a- and weak b-dipole rotational transitions are observed within each sub-state while strong c-dipole torsional transitions are observed between the two sub-states. Over 2300 transitions covering a range of J and K_a values to 80 and 34, respectively, have been fit to experimental accuracy using a fixed-frame-axis method (FFAM) Hamiltonian. The rotation, distortion and interaction constants have been determined. The 652 GHz *gauche+*-*gauche-* energy difference, strong *gauche+* to *gauche-* transitions and the constants derived from the analysis should enable rapid astronomical detection.

[a]Eizi Hirota, *J. Mol. Spectrosc.* **26**, 335 (1968).