THE GROUND STATE TORSION-ROTATION SPECTRUM OF PROPARGYL ALCOHOL,
HCCCH$_2$OH

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The ground state torsion-rotation spectrum of the asymmetric internal hydroxyl rotation in propargyl alcohol
(HCCCH$_2$OH) 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 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
d-bipole 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 SO 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 6.52 GHz gauche+-gauche- energy
differences are observed while the constants derived from the analysis should enable rapid astronomical detection.

$^a$Eizi Hirota, J. Mol. Spectrosc. 26, 335 (1968).

Time required: 15 min
Session in which paper is recommended for presentation: 7