ROTATIONAL SPECTROSCOPY OF ZnCCH ($X^2\Sigma^+$)AT MICROWAVE AND MILLIMETER WAVELENGTHES

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The pure rotational spectrum of ZnCCH ($X^2\Sigma^+$) has been measured using Fourier transform microwave (FTMW) and direct absorption millimeter/submillimeter methods in the frequency range of 7-260 GHz. This is the first study of ZnCCH by any spectroscopic technique. In the FTMW system, the molecule was synthesized using discharge assisted laser ablation spectroscopy (DALAS) from a mixture of 0.05% acetylene in argon and the ablation of a zinc rod. In the millimeter-wave spectrometer, the radical was created from the reaction of zinc vapor, produced in a Broida-type oven, with HCCH in a DC discharge. Spectra of the main isoplogue, ^{64}ZnCCH, as well as ^{66}ZnCCH, ^{68}ZnCCH, ZnCCD and Zn^{13}C^{13}CH have been recorded. The data have been analyzed with a $^2\Sigma$ Hamiltonian and rotational, spin-rotation and H, D and ^{13}C hyperfine parameters have been determined. The structure is being calculated based on the rotational constants and will be presented. Interpretation of the hyperfine constants will also be discussed.