MICROWAVE SPECTRUM AND STRUCTURE DETERMINATION OF THE CCP AND $^{13}C^{13}CP$ RADICALS ($X^2\Pi_r$)

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The microwave spectrum of the CCP and $^{13}C^{13}CP$ radicals ($X^2\Pi_r$) has been measured using Fourier Transform techniques. These species were created by the reaction of a mixture of PCl_3 vapor and acetylene diulted in argon carrier gas and a DC glow discharge. Two rotational transitions each were measured in the frequency range of 18 to 32 GHz. The lambda-doublets of the Ω = 1/2 component of CCP and $^{13}C^{13}CP$ were each split by phosphorus hyperfine interactions. For $^{13}C^{13}CP$, additional hyperfine splittings were observed due to both ^{13}C atoms, creating several doublets of doublets. These data were analyzed with a Hamiltonian incorporating three nuclear spins. The data were combined with millimeter/submillimeter measurements for CCP and $^{13}C^{13}CP$, and fit with a case (c) Hamiltonian, and effective rotational, lambda-doubling, and phosphorus and carbon-13 hyperfine constants were determined.