THE ELECTRONIC SPECTRUM AND RENNER-TELLER ANALYSIS OF THE C_2P FREE RADICAL

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Subsequent to our spectroscopic detection of the C_2X (X = P, As) free radicals,[a] we have studied the electronic spectrum of the jet-cooled $^2\Delta_i$ - $^2\Pi_r$ system of the C_2P free radical in the 490-630 nm region. High resolution spectra of the two spin-components of the 0_0^0 band of $^{12}C_2P$ have been recorded, and the rotational and spin-orbit coupling constants have been determined for both electronic states. Evidence of the Renner-Teller effect has been observed in both the $^2\Pi_r$ and $^2\Delta_i$ states, and the vibrational structure has been assigned and fitted to a Renner-Teller hamiltonian for $^{12}C_2P$ and $^{13}C_2P$. The molecular parameters predicted by density functionl theory are in good agreement with the derived experimental values and provide validation for the spectroscopic assignments. The molecular structure of C_2P in the ground and excited state will be discussed.

[a] F. X. Sunahori, J. Wei, and D. J. Clouthier *J. A. C. S.* **129** (9600), 2007.