THE ELECTRONIC SPECTRUM OF H_2PO, THE PROTOTYPICAL PHOSPHORYL FREE RADICAL

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The electronic spectrum of the H_2PO radical has been identified by laser-induced fluorescence (LIF) and single vibronic level (SVL) emission techniques. The radical was produced in a pulsed electric discharge jet using a precursor mixture of phosphine (PH_3) and carbon dioxide in high-pressure argon and the $\tilde{B}^2A'$ - $\tilde{X}^2A'$ electronic transition was detected in the 410-338 nm region. Low resolution LIF and SVL emission spectra of H_2PO and D_2PO have been recorded and the a' vibrational frequencies have been determined in both states. High-resolution spectra of the 0_0^0 bands of H_2PO and D_2PO, which consist of strong a-type and weaker c-type components, were recorded. The spectra have been rotationally analyzed and the excited state molecular structure determined. The spectrum of H_2PO will be discussed in comparison with the spectra of other phosphoryl and arsenyl radicals that have been recently studied in our laboratory.