

DETECTION OF THE H₂PS FREE RADICAL BY LASER SPECTROSCOPY

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The previously unobserved H₂PS free radical has been detected by laser-induced fluorescence (LIF) techniques. H₂PS (and D₂PS) were produced in a pulsed discharge jet using a precursor gas mixture of Cl₃PS vapor and hydrogen (or deuterium) in high pressure argon. Our *ab initio* predictions of the ground and excited state frequencies and excitation energy are in good agreement with the results obtained by vibrational analysis of the LIF and single vibronic level (SVL) emission spectra. High-resolution spectra of the hybrid 0₀⁰ bands of H₂PS and D₂PS were analyzed by band contour methods to obtain approximate ground and excited state rotational constants and molecular structures. The electronic transition involves promotion of an electron from the π to the π^* orbital and is assigned as $\tilde{B}^2A' - \tilde{X}^2A'$. The results will be discussed in comparison to *ab initio* predictions and the spectra of other X₂PS radicals recently studied in our laboratory.