THE PURE ROTATIONAL SPECTRUM OF HPS ($\tilde{X}^1A'$): THE THIRD ROW ANALOG OF HNO

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The pure rotational spectrum of HPS ($\tilde{X}^1A'$) has been measured using millimeter-wave direct absorption techniques in the range 229-415 GHz. This work is the first laboratory detection of this species in the gas phase. This molecule was created by the reaction of gas-phase phosphorus and H_2S in the presence of argon carrier gas and an AC glow discharge. The pattern of the rotational spectrum clearly indicated the presence of an asymmetric top. HPS, like HNO, has a bent structure. Data have been recorded for multiple K_a components from K_a = 0 to 6. The data have been fit with an asymmetric top Hamiltonian, and the spectroscopic parameters have been determined. The structure established from the rotational constants is in excellent agreement with ab initio calculations. Comparison with HNO suggests similar bonding in HPS despite the third row elemental substitutions.