

THE MILLIMETER/SUBMILLIMETER SPECTRUM OF CYANOPHOSPHINE, PH_2CN (\tilde{X}^1A')

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Cyanophosphine, PH_2CN (\tilde{X}^1A'), is the third row analog of cyanamide, a known interstellar molecule, and could be a potential interstellar species. However, only the microwave spectrum has been measured to date, and predictions at millimeter/submillimeter wavelengths have high uncertainties. Therefore, the millimeter/submillimeter spectrum of cyanophosphine has been measured using direct absorption techniques. This molecule was created by the reaction of gas-phase phosphorus, $(\text{CN})_2$, and H_2 in the presence of argon carrier gas and an AC glow discharge. Eleven transitions have been recorded in the range 305-422 GHz each with multiple asymmetry components from $K_a = 0$ to 8. No evidence of inversion splitting was visible in the spectrum. The data have been fit with an asymmetric top Hamiltonian, and the spectroscopic constants have been determined. The A rotational constant and several higher-order centrifugal distortion parameters have been determined for the first time, allowing accurate predictions in the millimeter/submillimeter region. Here we report our laboratory measurements and an astronomical search.