LINE PARAMETERS OF THE PH_3 PENTAD IN THE $4-5\mu$m REGION

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Line positions, intensities and line shape parameters are reported for four bands of phosphine between 2150 and 2400 cm^{-1} in order to improve the spectroscopic database for remote sensing of the giant planets. Knowledge of PH_3 in this spectral region is important for Cassini/VIMS exploration of dynamics and chemistry on Saturn, as well as for interpreting the near-IR data from Juno and ESA's proposed Jupiter mission. For this study, five high-resolution (0.0023 cm^{-1}), high signal-to-noise (¿2000) spectra of pure PH_3 were recorded at room temperature (298.2 K) with the Bruker IFS 125HR Fourier transform spectrometer at Pacific Northwest National Laboratory. Individual line parameters were retrieved by multispectrum fitting[a] of all five spectra simultaneously. Positions and intensities were measured for over 3100 transitions. The rotational quantum numbers of measured lines go as high as $J'' = 16$ and $K'' = 15$ in the ν_3 and ν_1 bands; some lines of the weaker bands $2\nu_4$ and $\nu_2 + \nu_4$ are also reported. The measured positions and intensities are compared to new theoretical calculations of the pentad. Lorentz self-broadened width and pressure-induced shift coefficients of many transitions were also obtained, along with speed dependence parameters. Line mixing coefficients were determined for several A^+A^- pairs of transitions for $K'' = 3, 6$, and 9. [b]

[a] D. C. Benner, C. P. Rinsland, V. Malathy Devi, M. A. H. Smith and D. A. Atkins, *JQSRT* **53** (1995) 705-721.

[b] Research described in this paper was performed at the College of William and Mary and the Jet Propulsion Laboratory, California Institute of Technology, under contracts and cooperative agreements with the National Aeronautics and Space Administration. L. Fletcher acknowledges support from a Glasstone Science Fellowship.